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The INDUSTRIAL-ARTS MAGAZINE

FEBRUARY 1929

THE BRUCE PUBLISHING COMPANY
NEW YORK MILWAUKEE CHICAGO

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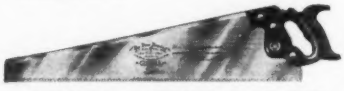

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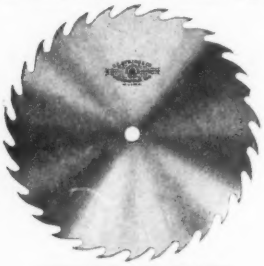

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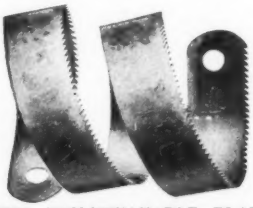

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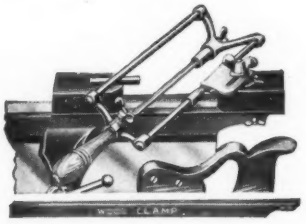

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The end of the first semester is fast approaching. What have we accomplished? Have our students acquired what they should have acquired? Are we sure that we know what they should acquire? Do we ourselves know just what our aims are? Have we an adequate way of measuring our results? Do we try to keep abreast of the advances made in the field of testing? Do we try to make use of the best that the newer methods contain, or are we satisfied to let our adverse criticism excuse our failure to understand and apply objective tests?

? ? ? ? ?

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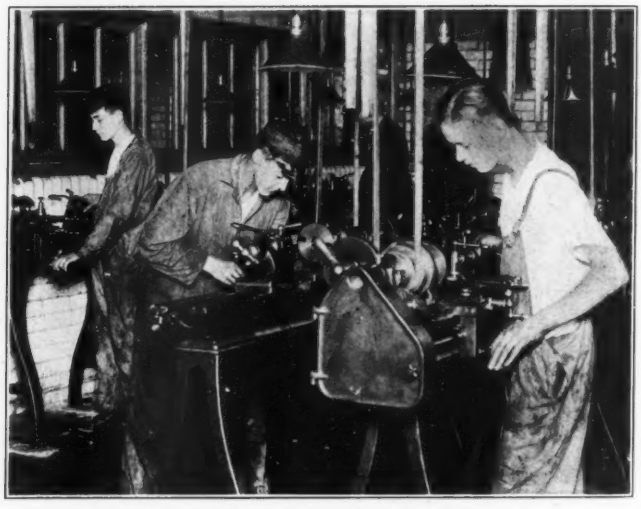
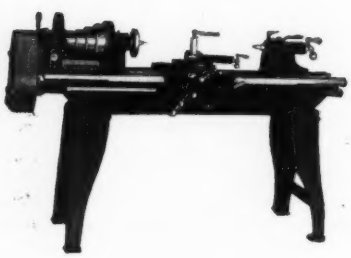


LIFE IS TOO SHORT for each of us to go clear back to the beginning and work out every problem for ourselves. Accordingly, success in teaching, as well as in business, depends to no small degree upon profiting by and taking advantage of other men's experience.

The fact that STAR Lathes, which represent more than 50 years experience in lathe manufacture, are part of the machine shop and tool room equipment in so many Industrial plants, has led to their installation in scores of Manual Training Schools—with a view to having the students learn on the same machine tools they will likely use when they start to work.



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THE INDUSTRIAL-ARTS MAGAZINE

VOLUME XVIII FEBRUARY, 1929 NO. 2

Testing the Industrial Arts in the Junior and Senior High Schools

Dale E. Mansperger, Zanesville, Ohio

MENTAL and educational measurements are comparatively recent developments. Intelligence tests have been employed in the testing of mental ability in a variety of ways. They have been useful in sorting out both the subnormal and the genius. Intelligence tests, as they have been devised, fall into two groups; (1) individual tests, and (2) group tests. We who are engaged in public-school work are primarily interested in the group intelligence test, since it gives a valuable estimate of the mental ability of each individual in a class and is much more economical of time than the individual intelligence test. A number of valuable tests of both groups have been devised.

The development of educational measurement is an outgrowth of mental measurement. In the field of educational measurements, as in other fields, "necessity has been the mother of invention." Educators have perceived the need and possibility for some definite measure of the results of education; consequently, educational tests have been and are being devised by educators and psychologists. Educational tests may be classified into two groups; (1) rate tests, and (2) scales.

There are a great many reasons for testing in any subject. When we make use of an intelligence test, we are making an attempt to ascertain an individual's mental capacity *to do*. When the educational test is employed, an attempt is being made to ascertain an individual's *achievement* along a certain line as the result of the educational process. When applied to the public school, the purpose in testing is determined by the objectives of the teacher or of the superintendent. Some of the reasons for testing might be listed as:

1. To inform pupils of their achievement.
2. To diagnose a student's difficulties.
3. To discover special ability.
4. To serve as a basis for educational and vocational guidance.
5. To rate the teacher and the teaching method.
6. To predict a pupil's future success.

The aim of educational testing should be the improvement of instruction and of educational opportunities for the students of the public school. There are three methods of educational classification of students:

1. Personal opinion.
2. Comparison.
3. Standardized tests.

Everyone will agree that we need new instruments for measuring the achievement of our boys and girls. The old method of the "essay type" examination and subjective rating which exists in a large number of schools today is entirely unsatisfactory. One can readily see the absurdity and unfairness of grading a pupil according to the likes and dislikes of the instructor. Objective scoring is practically new, and the attempts at objective scoring that have been made so far, have not reached a great degree of perfection.

Standardized tests have a number of forms. They may be either subjective tests or objective tests even though they are tending more toward objective rating. In the majority of standardized tests, however, there is a possibility for the subjective element to enter into the scoring.

There is a wide range of opportunity for work of real worth to be done in the construction of educational tests. We need more aptitude tests so that we may detect special ability and have some basis for vocational and educational guidance. We need more accurate measures of more limited portions of the fields to which they apply. In proving the impossibility or inadvisability of teaching some of the present school subjects to certain groups of pupils, improved tests may suggest new types of subject matter, so that all types of students may obtain more real benefit from our public schools.

The field of industrial arts is still relatively new, and the testing of industrial arts is newer still. This is due to the incorrect ideas about testing in this subject. Some thought that there wasn't anything to test or measure. If there isn't anything to test, is there anything to teach? Others thought that there was no need for testing because of the inherent difference from the three R's. Another objection might be that because of the nature of the work there is not sufficient time in the usual examination period to test the student adequately.

There is an abundance of knowledge and technical information involved in industrial arts which can be tested readily on paper. These paper examinations may be given in the regular examination period. There is a very high correlation between the results obtained from the paper examination and those obtained from the performance type of examination. As for cheating,

the chances are no greater than in any other subject. Even in the performance test, it is very easy for the instructor to change a dimension, or a minor detail of the design, so that individual work would have to be done.

One of the real obstacles, and possibly the greatest, is the general failure on the part of the instructor to appreciate the possibilities of tests in schoolwork. The average teacher does not have the real objectives of the course well in mind, and he does not think of what knowledge his students should have.

As has been said before, industrial-arts testing is in its infancy. It is in its experimental stage. Because of the prevalence of the peculiar ideas about industrial arts, mentioned in the foregoing, few tests have been devised. At the present time there is a great need for a measuring instrument for the industrial-arts program. The testing and checking phase of industrial arts has probably never received its due share of attention. Pupils are tested for one or all of the following: (1) knowledge, (2) reasoning power, and (3) specific habits. An adequate testing program should be an integral part of every well-organized course of instruction. A testing program tends to objectify the teaching process; therefore it is well to lay out a testing program at the beginning of the course.

The testing of the industrial arts involves an added phase or difficulty from that of testing of the three R's since manual skill is involved. There is both technical information and knowledge related to the subject and the skill in the fundamental operations which must be tested.

Selecting Tests

In judging or selecting any test, we should have some standards by which we can select a good test. In the field of industrial arts, the criteria for judging a good test are practically the same as for other subjects. The most important thing to consider in a test is its validity. If a test does not measure what it is supposed to measure, it is useless. The material going to make up the test should be taken from reliable subject matter covering the course. A test should be reliable, that is, there should be a high correlation between the results obtained from the test when given a number of times or of duplicate forms of the test. If a standardized test is selected, norms should be established in order that a teacher may compare his group with other groups and have a basis for giving school marks. Scientific procedure should be employed in the setting up of norms if they are to be reliable. The standardized tests for industrial arts are few and far between, consequently, if a testing program is to be employed, the teacher must be interested in informal tests.

There are numerous informal tests which may be used to advantage. A number of tests of this nature have been constructed, and the teacher with a little effort can work out his testing program by constructing a number of tests of his own. The "new type" examinations are coming into use more and more in the industrial-arts field. Writing is reduced to a minimum, thus enabling the instructor to cover a larger block of the information which the student is expected to know. These examinations are relatively objective. The questions of which any of these examinations are composed should be carefully chosen or the tests may become very much of a joke and worse than no test at all even though it is objective. The "essay type" test requires a great amount of time to give and score, and the scoring is wholly subjective. The visual or identification method of testing is valuable for a number of phases of the work. It is really unnecessary to mention more about the merits of an objective test, or about the unsatisfactory characteristics of subjective testing.

Educators are becoming more and more interested in educational and vocational guidance and are coming to see the value and possibilities of this guidance. There is an increasing need for tests of special ability, consequently, the teachers of industrial arts should give a test to our beginning students which will detect mechanical aptitude. By giving an aptitude test to beginning students, it is possible to obtain results which will aid in making class divisions, in making suggestions for the future line of work of the student, and in evaluating the student's work. The importance of measuring mechanical ability far outweighs the obstacles met. Modern life is permeated with machines and mechanical devices, and the ability to manipulate them is becoming of increasing importance to everyone. Every individual is concerned directly or indirectly with mechanical contrivances.

Probably the first test of mechanical ability of importance was the Chapman Trade Tests designed for use in the United States Army. They were employed in the selection of men for positions requiring special mechanical ability. Next, the Standardized Assembling Tests were devised by John L. Stenquist. The outgrowth of the Assembling Tests was the Stenquist Mechanical Aptitude Tests.

In testing for mechanical aptitude, any "material test" is impractical for classroom work because it is difficult to administer. The materials required for the test are bulky and are hard to keep in good condition. Too much time is required for giving and scoring. The Stenquist Mechanical Aptitude Tests employ the thing which is nearest the actual object—pictures. Answering the questions in the test requires keen mechanical perception and ability to reason out a mechanical problem. No previous experience with the machine is presupposed. The ability to answer the questions depends upon the mechanical insight of the subject rather than any direct knowledge or experience with the machine. For the best measure, both an assembling and a picture test should be used. For all practical purposes, the picture test would be sufficient, since both tests tell practically the same story. The correlation between the results of the two tests mentioned in the foregoing is .88. The picture tests have the advantage of time over the assembling tests, since they may be given and scored in much less time.

Whenever possible a test of abstract intelligence should be given in connection with the aptitude test. Pupils behind in abstract ability are not always behind in mechanical ability and vice versa. Correlations with more subsequent and perfected mechanical tests show that the true correlation is seldom over .4. "The correlation may be low, but it is always positive."

The Stenquist Mechanical Aptitude Test is essentially an aptitude test and has prognostic value. It should be given at the beginning of the term. A test of this nature is suitable for all phases of manual arts. About the middle of the term a diagnostic test should be given. The purpose of this test is to diagnose the student's difficulties. With the results of a diagnostic test before him, it is possible for the instructor to arrange his teaching method or procedure so that he will strengthen the weak points in the pupil's achievement. The Hunter Shop Tests is a valuable set of tests of this nature. The set is composed of seventeen individual tests which cover a number of phases of manual-arts work. For woodworking, the most valuable formal test available is the Nash-Van Duzee Industrial-Arts Tests. There are two tests, Scale A and Scale B, both of which will be standardized in the near future if they are not at the present time. Scale A was designed to measure technical and related information covering such material as may be objectively tested on paper. Scale B was designed for the testing of technical skill found in the manipulation of various tools and machines. The tests cover both junior- and senior-high-school woodworking so that it is possible to keep a progressive record of a pupil's achievement.

When Tests Should Be Given

An achievement test should be given near the end of the term. If the instructor does not construct a test of this nature himself, he will have only a small number of tests to select from. Either the Hunter Shop Tests or the Nash-Van Duzee Industrial-Arts Tests may be used again as achievement tests in the field to which they apply. In the junior high school, the Patrick Industrial-Arts Tests may be used.

The past two or three decades has forced recognition of the importance of industrial arts and industrial education, and there is scarcely a school that does not make some provision for manual work. The problem of measuring mechanical ability has not been solved, but specific contributions have been made. In the use of all tests, it is necessary to interpret the results obtained very carefully. All facts involved in the giving of the test should be taken into consideration. Along with it all an ample supply of common sense is not only desirable but essential if the results are to be of any value.

The school systems, as they are at the present time, are made up of heterogeneous groups with the result that neither the high nor the low in mentality receive adequate training. By the employment of adequate tests and testing methods, we may be able to separate the pupils in our industrial-arts courses into homogeneous groups with the result that we can give adequate training to all types of pupils. By the use of tests we are able to give fairer and more accurate school marks.

Relatively few tests have been constructed covering the testing of industrial arts. Many new tests, however, are being constructed at the present time, and attempts are being made to standardize some of those that we have. In the future, no doubt, there will be an adequate supply of tests covering the various subjects, from which the instructor can select one which will fulfill his needs. The tests now available are much more valuable as instruments for measuring than the old form of subjective testing.

There is considerable room for improvement of the tests in this subject as in other subjects. The tests in industrial arts are not up to par with those in the three R's. This is largely due to the peculiarities of the subject and the fact that creative work along this line has not been in vogue for such a great length of time. In order to test complete ability, two forms of tests are necessary: one form to test technical information and knowledge and another to test technical skill. Any test which does not have these two forms cannot be a complete test or a highly reliable test.

Your Opportunity

G. Lewis Parsons, Southside High School, Elmira, N. Y.

AN effective means for putting across the shop idea to many of those who cannot or will not otherwise become boosters, is a play making liberal use of the actual shop equipment.

It is a well-known fact that many of the school's chief publicity agents—the boys and girls and often many academic teachers—may attend school in the same building for years where shopwork is taught without knowing much of its real aims and activities. Indeed, many parents and other taxpayers will live in the community for years without gaining an adequate understanding of what the shops are trying to put across to their own boys and girls.

With this in mind the industrial-arts teachers of the Elmira Southside High School set out to sell their school shop to the rest of the school, and incidentally more widely to the community in general. Plays available for this purpose did not seem to bring out to a marked degree both the aims and activities of the industrial group. Consequently, the industrial-arts teachers wrote and directed a play to their liking which seemed to fill these requirements.

While the play as it is written may not in its entirety fit the equipment and need of every school, yet it may be a suggestion and a definite help to those who have this same problem to solve.

Title: YOUR OPPORTUNITY
An Industrial Play in Two Acts
(Playing Time—45 Min.)

TIME—The Future.

ACT I—Employment Office.

Office furniture placed in narrow space across the front of the stage; arranged from left to right—Employment Manager's office (on left of stage), hall tree, letter file, two chairs, and office desk.

Outer office (on right of stage), clerk's file, chair, clerk's desk, and a long wooden bench capable of seating five or six people.

ACT I

Curtain opens and finds the employment clerk sitting with feet on desk, chair tipped back and reading the morning paper. Clerk's face is hidden behind his paper. Three ap-

plicants sit on bench facing audience also with faces hidden behind papers. All are diligently reading. No one moves for 10 or 15 seconds.

At this point the employment manager, Mr. Efficiency, enters briskly from left side, takes off hat and hangs on costumer, then, as he sits down at his own desk, calls cheerfully to clerk who hasn't noticed his entrance.

"Good Morning, George."

CLERK

"Good Morning, Mr. Efficiency."

(Clerk drops paper and feet to floor hastily and starts arranging cards on his desk.)

MR. EFFICIENCY

"Do we have any applicants in answer to our advertisement in the morning paper?"

CLERK

"Yes, Mr. Efficiency, two men were here when I arrived."

MR. EFFICIENCY

"All right, you may bring the first man in."

(Clerk goes to door of waiting room and signals the first man to appear.)

Applicant then walks into Mr. Efficiency's office.

MR. EFFICIENCY

"What is your trade?"

APPLICANT

"Electrician."

MR. EFFICIENCY

"Where did you work last?"

APPLICANT

"Wright Electric Company."

MR. EFFICIENCY

"What wages?"

APPLICANT

"One dollar per hour."

MR. EFFICIENCY

"Are you an all-around electrician?"

APPLICANT

"Yes, six years experience as a journeyman."

MR. EFFICIENCY

"Were you ever on strike?"

APPLICANT

"No, sir."

MR. EFFICIENCY

"Did you take an industrial course in any school?"

APPLICANT

"Yes sir, Southside High School."

MR. EFFICIENCY

(To clerk). "All right, give this man a card for Monday."

APPLICANT

"Thank you." *(Applicant passing out, signs card at clerk's desk.)*

MR. EFFICIENCY

"Next."

(Applicant No. 2 enters. Practically the same questions and answers are given again, except applicant No. 2 applies for job as patternmaker. After applicant No. 2 is disposed of, applicant No. 3 enters and applies for job as an auto mechanic. For this case all questions and answers are the same as before, except that applicant No. 3 has no technical training and therefore Mr. Efficiency does not hire him. Applicant No. 4 is called "Tom Shirk," and is a typical "down and outer." While applicant No. 3 is being interviewed, Tom Shirk slouches into the waiting room and takes a seat on the bench.)

TOM SHIRK

(To clerk as applicant No. 3 passes out.) "How's chances for a job?"

CLERK

"Mr. Efficiency will take care of you, step right in." *(Points to Mr. Efficiency.)*

MR. EFFICIENCY

"What can I do for you?"

TOM SHIRK

"I wanter job."

MR. EFFICIENCY

"What can you do?"

TOM SHIRK

"Oh, anything."

MR. EFFICIENCY

(Leaning forward and looking at the man). "Isn't your name Tom Shirk?"

SHIRK

"Yeh, that's me."

MR. EFFICIENCY

"Then you went to the Southside High School when I did."

SHIRK

"Yeh, guess I did."

MR. EFFICIENCY

"Well, Tom, I will see what I can do for you. Do you have a trade or any other specialty?"

SHIRK

"No, I ain't got no trade and I never was nothing for bookwork. I quit that classical course at school and took a soft job ushering in a theater. The manager soon 'canned' me to give his cousin the job. And that is the way it has always been—*hard luck all the time.* I get a job and have it a little while and then I get fired. They all say I lack training."

MR. EFFICIENCY

"Well, that seems to be true, Tom, and I doubt if I can place you today."

SHIRK

"Oh, Mr. Efficiency, won't you please give me some kind of work? My wife is sick and I have seven small children crying for something to eat."

MR. EFFICIENCY

(Thinking for a minute). "The best I can do for you, Tom, is a trucking job about the shop and then I am squeezing you in. It seems to me, Tom, your time at the Southside High School was poorly spent. You were taking a course which lead to college when you had no intention of going. Why didn't you try their industrial courses?"

SHIRK

"Guess I was looking for one of them white-collar jobs then."

MR. EFFICIENCY

"You are not too old, so I would suggest that you take a Night-School Course and get some technical training. You know such courses are being offered at the Southside High School now."

SHIRK

"Thanks for the job and the advice. When do I report?"

MR. EFFICIENCY

(Handing Shirk a card.) "This afternoon."

SHIRK

(Backing away.) "Thanks very much, Mr. Efficiency, thank you."

(Shirk departs.)

(As Tom Shirk is departing through waiting room, Mr. Swift enters. Hesitates a moment to look at Tom Shirk.)

(Mr. Swift enters Mr. Efficiency's office.)

MR. EFFICIENCY

(Rises—shakes hands with Mr. Swift.) "Well, well, how is the boy? Have a chair."

MR. SWIFT

"I just dropped in to talk a few minutes. Was thinking about old school days."

MR. EFFICIENCY

"Did you see Tom Shirk go out?"

MR. SWIFT

"Saw someone I thought I should recognize."

MR. EFFICIENCY

"Well, that was old Tom, down and out—the same old story "no training." And now that you are thinking about school days, why not go down with me to visit the Southside? I must interview some boys that are graduating this June from the industrial department for I can place several with their training immediately. Besides, it will do you good to take a peek through the shop again."

MR. SWIFT

"Sure, I would be glad to, and will take the time." *(Mr. Efficiency takes coat and hat and departs with Swift. They continue conversing as they leave the stage.)*

CURTAIN

In setting the stage for Act II, as much as possible of the actual shop machinery, work under construction, and some finished products were arranged on the major part of the

stage in such a way as to be readily seen from the auditorium, and each shop grouped so that Mr. Swift and Mr. Efficiency appear to be passing from one shop to the other during the trip of inspection that goes to make up Act II. As the visitors pass along, each shop in turn is brought into prominence and acts its part. (The identity of the shop equipment in use is quite self-explanatory from the text that follows.)

ACT II

Stage set, Jamie at work at the drafting table. (Enter Mr. Efficiency and Mr. Swift.)

MR. EFFICIENCY

"This is our Drafting Department where the designing, drawing, tracing, and blue printing is carried on."

MR. SWIFT

"Why, this seems to be a really busy place. I supposed that the drafting room was always tucked away in some cooped-up corner where no one else would go."

JAMIE

"Well, that used to be the case, but the work-a-day world has a great deal more respect for the draftsman than formerly. Since all the work of the shops and the building trades, and in fact all construction work is dependent upon the work of the draftsman and designer, he really comes at the head of the list. With all the other work centering around the drafting room, it is natural that it should be given a desirable location."

MR. EFFICIENCY

"Well, Jamie, I'm glad to see that you have a real respect for your work and I think that you are justified. What is this you are working on now?"

JAMIE

"Well, Mr. Efficiency, we have several jobs which ought to be rushed out, but just at the moment we are making some alterations on the tracings of a cooking table. We are incorporating an advanced safety first idea in this model."

MR. SWIFT

"I didn't know that cooking tables could be classed as hazardous machinery and in need of safety devices."

JAMIE

"Oh, they're not exactly dangerous, but you know we had a near panic in the cafeteria recently and some of the ladies were scared nearly to death! Now, if our kitchen had been equipped with this advanced safety device, the panic would have been avoided."

MR. EFFICIENCY

"Won't you tell us about the device?"

JAMIE

"Certainly, Mr. Efficiency. You see it's a new type of flour bin."

MR. SWIFT

"But I don't see any safety idea about a flour bin. How do you figure that out?"

JAMIE

"Well, what caused the cafeteria panic?"

MR. SWIFT

"I'm sure I don't know, Jamie, what was it?"

JAMIE

(Mysteriously). "Mice! Mr. Swift, Mice!"

MR. EFFICIENCY

"Ha, ha, that's a good one, eh Swift? But still I'm in the dark about the flour bin."

JAMIE

"When do women most fear mice? Why, when they are on the floor. Well, this flour bin is a combination bin and mousetrap with a safety compartment or receptacle for the mice, which may be removed and emptied as one would empty the ashes from a furnace pan. That keeps the mice off the floor and gives the ladies freedom from worry, and danger of prostration or death from fright."

MR. EFFICIENCY

"Well, that's a new one on me. Never thought of it in that light before."

MR. SWIFT

"May I ask what these blue prints represent?"

JAMIE

"Certainly, sir, they describe a perpetual-motion machine. This is an outside job. Do you know what I call it when no one is around?"

MR. SWIFT

"No, what do you call it?"

JAMIE

"I call it the perpetual *notion* idea. Why, that inventor fellow has some of the queerest names for some of the machine parts that I ever heard of. This part *(pointing to print)*, for instance, he calls the *Auxiliary compound double-interacting super-imposed high-pressure relief valve;* and this one is the *Triple-acting hydrostatic gravity counter-balanced starting mechanism.* If I had to remember all those jaw breakers I think I'd be loony."

MR. EFFICIENCY

"Well, Jamie, I guess we'll have to be trotting along. Thanks for showing us your work."

(Exit.)

(Mr. Efficiency and Mr. Swift enter Woodshop.)

MR. SWIFT

"Well, this looks like the Woodshop."

JIM

(Starts motor.) "Yes, this is where we make the shavings fly." *(Produces a stream of shavings at lathe. Removes completed job from lathe. Takes position with other boy on assembly of table. Shuts motor off.)*

MR. EFFICIENCY

(Swift and Mr. E. walk about inspecting work and hesitate before notebook rack.)

"Jim, what are they going to do with this cabinet?"

JIM

"Preserve the Archives of the Southside High School. You know there are 120 spaces in the cabinet and we constructed two such cabinets. Starting with the year 1924 when the school was first opened and allowing one year to each space they will fill the need for the next 240 years or the year 2164. That goes to show how well the Southside provides for its future."

(Mr. Swift and Mr. E. stop at assembly of table which is continued to a certain point.)

MR. SWIFT

"This begins to have the appearance of a table."

JACK

"Yes, a cooking table—just a little order for four of them. Most of the machine work has been completed and it is now only a matter of assembly."

(Boys give prominence to joining of parts.)

MR. EFFICIENCY

"Surprising how wood parts are put together."

(Boys start assembly of drawer.) "Just watch the assembly of that drawer."

(When back is ready boy goes to jointer or trimmer and takes a cut or so. Returns and fits back in position.)

MR. SWIFT

"And to think some folks believe the school shop does not lend itself to practical work. Well, they should see this."

MR. EFFICIENCY

"Well, boys, you have chosen a good work, one in which there are many opportunities for advancement."

JACK

"Yes, and think of the many types of work to which the woodworker is related—for example, carpentry, cabinetmaking, wood turning, patternmaking, toy making, wood finishing, airplane building, stair building, floor laying, auto-body building, and a host of others."

MR. EFFICIENCY

"Quite so, boys, and stay with it until you graduate. It is this training that counts."

(Mr. Efficiency and Mr. Swift walk to next shop.)

(Mr. E. and Mr. S. approaching machine-shop group.)

MR. SWIFT

"What's that thing those boys are working on?—short legs—long body—head and tail—looks like one of those sausage dogs."

MR. EFFICIENCY

"I dare say the boys can tell us."

BILL

(To Mr. E.) "That is a bench lathe for turning small

round work out of steel." *(To Bob.)* "Get the electric drill, Bob, so we can drill this other hole."

BOB

(Lazily.) "Aw, let's wait until tomorrow to finish it."

BILL

"No, 'Eventually, why not now'—we'll have time if we work fast."

(Bob pulls electric drill from under the table. Bill grabs it impatiently and starts with dull drill. Crowds hard against drill a moment then remarks:

BILL

"That drill isn't sharp enough to cut hot butter. Start the grinder and I'll try to sharpen it."

(Grinds drill vigorously—lots of sparks—then picks up new drill to put back in electric drill.)

BOB

"I'll try to grind one while you are drilling that hole."

(Both drill and grinder running a few moments.)

MR. EFFICIENCY

(As drill and grinder stop.) "I wonder if you boys ever thought much about the importance of the iron and steel industries."

BOB

"I know that my Dad comes home from the shop every night too tired to be pleasant to us kids. He operates three machines that run at top speed to get out as many pieces as possible."

MR. EFFICIENCY

"I imagine, Bob, if your father had been given the opportunities that you have, he wouldn't have to work at that kind of a job."

BILL

"I have thought enough about iron and steel and the machine shop to realize that without them we would have no railroads, automobiles, electric power, water systems, or thousands of other things—in other words, we would have to walk, ride horseback or ox cart and go to the river for water —wouldn't it be great to drink out of the roaring Chemung?"

BOB

"I don't get the idea of spending two or three years learning to operate these machines because I want to get in the business from the office end."

BILL

"I think you will find, Bob, that most of the real successful men in the iron and steel industry started from the shop end. I've been told that only about half of all employees in manufacturing companies are producers, that is, operate machines, the other half being in the offices—or foremen, inspectors, etc. So you see, if you learn both practical and technical material you are pretty sure to land a good job."

MR. EFFICIENCY

(Laughingly.) "That's just about the right idea, and if you keep on driving, maybe Bob will amount to something after all."

ELECTRIC SHOP

MR. SWIFT

"What have you here?"

BILL

"This is the Electric Shop. These boys are wiring and testing a generator."

(Use spark gap while boys apply wires to different parts of the generator.)

MR. EFFICIENCY

"Just what are you doing now, Bill?"

BILL

"We're giving her the voltage breakdown test."

MR. SWIFT

"Is there any danger?"

BILL

"No, not to the boys, they know what to touch and what not to. Anyway there is nothing here that would really injure them, 'all bark and no bite,' you might say."

MR. SWIFT

"I am glad to know that, I always considered this a shocking business."

BILL

"I guess the only time you get a shock is when you pay the electric-light bill."

ED

"Say, this generator tests O.K."

BILL

"All right, shove in the switch and give her the running test."

(Here, motor belted to generator is run while being examined critically.)

MR. SWIFT

"Can all the boys that graduate here find a job in the electrical field?"

BILL

"They ought to, for this course gives them a general knowledge to use later in many branches of the business."

"Let's see—there's Radio Broadcasting, Radio Construction, Power Distribution, Power-Plant Operation and Construction, Electro Plating, House Wiring, Instrument Making, Auto Ignition, Salesmanship, Switchboard Operator, Electric Railway—Operation, Construction, and Maintenance; Electrical Engineering, Teaching, Motor and Generator Manufacture, Operation, Maintenance, Repair; Storage-Battery Work, Telephone and Telegraph Work, (Cable splicing and executive positions, not to mention several others.)"

MR. EFFICIENCY

"Let's look into the next shop."

AUTO SHOP

MR. EFFICIENCY

(Walking up to Auto Division.) "We have nice equipment in this shop, for instruction purposes."

(Boys work on small chassis with headlights directed toward audience.)

MR. SWIFT

"Are you an auto mechanic now?"

JACK

"Oh, yes, I expect to graduate this year and then I am going to work for Cramer who graduated in 1925. He has a good-paying garage of his own."

FRANK

"Well, why shouldn't he make money? He has a lot of pep, he is agreeable and pleasant and knows his business. With this combination, and the opportunities offered in the auto industry, he will soon be independent."

JACK

"Opportunities are good. Only the other day I read in a trade journal that there are about twenty million autos in use in the United States. We have manufactured about twenty-nine million, and exported three million. About six million have gone to the junk pile. To buy and operate these machines, has cost the people of the United States more than twice the amount of the world war."

FRANK

"Well, if you say so, it must be all right, but that would be a lot of automobiles to have on Water Street at one time."

JACK

"Well, Frank, if we can make these lights work now, we will call it a day."

(Headlights arranged to flash off and on alternately in a peculiar way.)

MR. EFFICIENCY AND MR. SWIFT

"Well, good-by boys."

(Move on.)

(After visiting Auto Shop, Swift and Efficiency step to the front of the stage.)

MR. SWIFT

"Well, this has certainly been time well spent. I wonder where Tom Shirk would be today if he had grasped the opportunities these boys have?"

MR. EFFICIENCY

"That is what I was thinking, but there are many Tom Shirks who go out into life unprepared. That is why the schools are attempting to prepare them for life and one of the means is industrial training. While it may be termed the baby of education, it is surely a live and growing one and deserves our earnest thought and consideration."

(At this time, as Swift and Efficiency slowly walk off the stage, all machinery is turned on and the shops all work full force for two or three minutes.)

CURTAIN

The Contract Plan and Related Subject Matter

Emerson Wm. Manzer, Supervisor of Manual Arts, Bronxville, N. Y.

THE general shop, with its related activities, has a splendid opportunity to depict for the student the relationship and interdependence of various occupations. Through the related subject matter used in this type of shop, the student can get a much wider radius of knowledge and specific information about the occupations being studied, and furthermore, through his actual participation in the occupation, which is the vitalizing element of all shopwork, he is able to build up a practical fund of information that will make him enjoy his work to the fullest extent. Even though this shopwork or participation is done only on a small scale, it provides interest and also a motivating element. A more vivid view into the great realm of industry is thus secured.

The contract plan and its guiding principles has proved to be a practical and efficient method for teaching the fundamentals of general shop subjects and the related matter pertaining to them. It not only supplements the class demonstration, but it also provides an opportunity for greater creative imagination and native ingenuity or inventiveness. It forms a practical guide to the student and places a direct responsibility on him for the completion of a selected contract. This responsibility for fulfilling a specific contract is one of the strongest points in favor of the contract plan for it makes the individual "dig for himself." This phrase is much used by leading educators who are in favor of a new plan of education; one that will displace the "hand-it-down" method of yesterday. It is recognized that the general educational growth of the student should be the real aim of teaching, and that the present method does not lend itself to this end. In the manual-arts subjects there is afforded a wonderful opportunity for each instructor to do his part toward this new plan of education. The related subject matter for all manual-arts subjects is very plentiful and is of such nature that students will enjoy reading it. When the contract plan is used, the assigned reading matter is done with very much interest. The reason for this is credited to the practical means of procedure and the interesting manner in which the sheets are arranged. A concrete example of this plan will be shown as a supplement to this article.

In this contract, which is a contract for a candlestick pattern, each student is required to make his own design for his pattern. He is also required to make some investigations and possibly some research in order to gather the necessary material for his contract topic. The "A" contract, for example, calls for a paper on "The Making of Candles in Colonial Days." It is quite evident that he will have to do much library work in order to get material for a good paper, one that will stand the test when it is presented before his classmates. This topic will make any student "dig for himself" and in so doing he will learn the "how" of getting material for a special topic. It calls for a concentrated effort on a certain specified problem and the grade received for his work will depend upon the quality of the material found. Oftentimes a student desires to write a topic on some phase of related work other than the suggested topic of the contract. Experience with many contracts has shown that some boys, through travel or in some other way, have obtained first-hand information about some industrial activity that will be more interesting to the class.

This flexibility in the assignment makes the work more dynamic, and develops initiative and resourcefulness, two worthy traits that ought to be inculcated in every growing boy.

The following contract has been used with success in the manual-arts department of the Wisconsin High School of the University of Wisconsin. This shop, which is experimental in nature, is under the guidance of the Department of Industrial Education and Applied Arts of the University of Wisconsin. Many problems of the profession have been tried out in the shops and the results published so that the manual-arts men at large can weigh the findings in their own shops. After considerable experimental work with various forms, it was found that the form of the following contract proved very satisfactory. The general organization of the sheets proved to be useful in motivating the plans of the instructor; it helped to vitalize the subject and created a desire to do more shopwork, and in many instances, extra reading references were requested by the students.

SAMPLE CONTRACT

The system of grading the contracts proved to be another incentive for doing better work and for studying the related subject matter. The grades ran from "A" plus to "A" minus, except in the "C" contract where a "poor" grade was added to "pep up" the "loafer" and thus make him produce with the others of the class. It was up to each one to pick out a contract and then see that it was fulfilled and handed in on time.

CONTRACT

Pattern for Low Candlestick

Specifications:

Wood: Soft pine.
Dowels: ¼-in. dowel rod.
Use corrugated fasteners to hold wood together.

Finish:

Black shellac on projections; orange or white shellac on pattern.

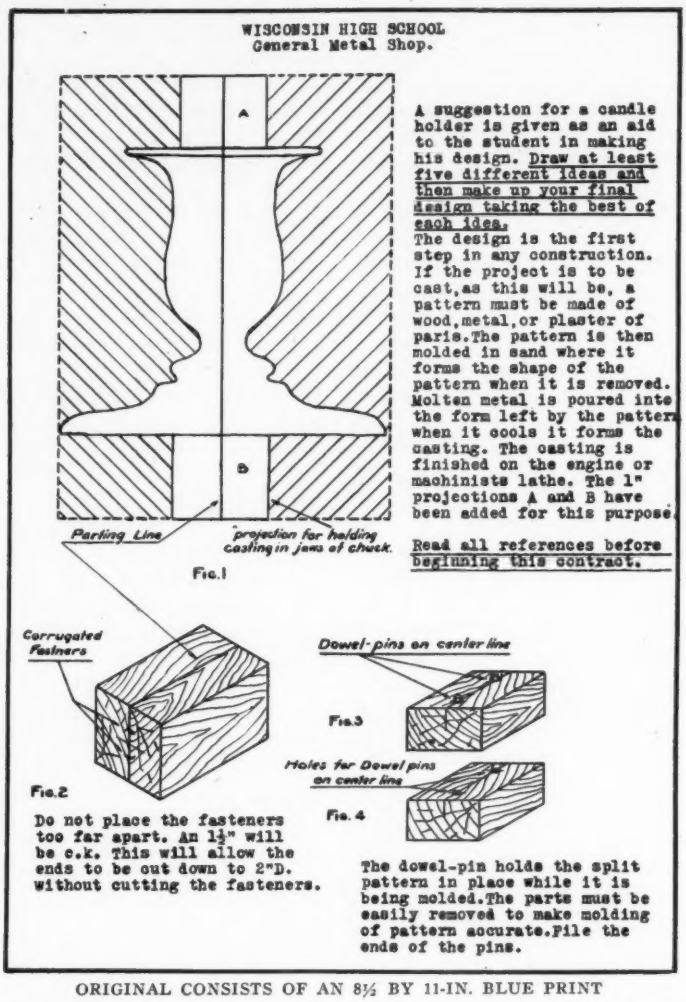
Tools:

Hand saw; jack or smooth plane; rule; ¼-in. forstner bit; brace; general lathe tools; sandpaper.

Procedure:

1. Study the blue print and then make your designs. Add 1 in. for A and B.
2. Place general dimensions on the finished sketch of the design. Get O.K.
3. What size pieces will you need to make your pattern? Why do you need two pieces? Why do you have to add two extra inches?
4. Cut one length for both parts. Why? Plane the surfaces and cut to length. Gauge the center line on each piece. (See Figs. 3 and 4.)
5. Measure 2 in. from each end on the center line. Locate the center for the dowel.
6. Drill ¼-in. holes ⅜ in. deep. How can you drill to this depth?
7. Cut two pieces of dowel rod to fit into the holes in one part only. Why? How long will these dowel pins be? File the ends round. (See Fig. 3.)
8. Glue the dowel pins into one part of the pattern blocks. Remove all extra glue.

9. Fit the pieces together. Do the center lines coincide? Do the blocks pull apart easily? What caution should you take here?
10. Fasten the parts together with corrugated fasteners. (See Fig. 2.)
11. Charge the stock on your cost record. Get O.K. on the work done.
12. Read the references on turning before starting the next step. Use a scrap piece of stock for practice.
18. Start the lathe and rough-cut to the largest diameter. Use a gouge.
19. Set the belt for the third speed. Why can the speed be increased?
20. Start the lathe. Set the rule against the stock. Touch the revolving stock with the pencil to make the necessary measurements.
21. Cut down the ends to the largest possible diameter. Avoid cutting into the metal fasteners. Use a part-


WISCONSIN HIGH SCHOOL
General Metal Shop.
A
B
Parting Line
projection for holding casting in jaws of chuck.
Fig. 1
A suggestion for a candle holder is given as an aid to the student in making his design. Draw at least five different ideas and then make up your final design taking the best of each idea.
The design is the first step in any construction. If the project is to be cast, as this will be, a pattern must be made of wood, metal, or plaster of paris. The pattern is then molded in sand where it forms the shape of the pattern when it is removed. Molten metal is poured into the form left by the pattern when it cools it forms the casting. The casting is finished on the engine or machinists lathe. The 1" projections A and B have been added for this purpose.
Read all references before beginning this contract.
Corrugated Fasteners
Fig. 2
Do not place the fasteners too far apart. An 1½" will be c.k. This will allow the ends to be cut down to 2"D. without cutting the fasteners.
Dowel-pins on center line
Fig. 3
Holes for Dowel pins on center line
Fig. 4
The dowel-pin holds the split pattern in place while it is being molded. The parts must be easily removed to make molding of pattern accurate. File the ends of the pins.

ORIGINAL CONSISTS OF AN 8½ BY 11-IN. BLUE PRINT

13. Remove the live center from the lathe. Drive the points into the end of the stock. What extreme caution *must* be taken at this point? Why? Be sure to find out.
14. Replace the live center in the headstock of the lathe.

References:

Wood Pattern Making. McCaslin, pp. 168-178, pp. 214-215.
Pattern Making. Turner and Down, Chapters 1, 2, 6, 71.
Wood Turning. Klenke, pp. 17-33, 103.
Woodwork for Secondary Schools. Griffith, Chapters 5 to 9.
Wood Pattern Making. Purfield, Chapters 4, 5, and 6.

15. Fit the stock to the live center and place the dead center on the other end. Fit the dead center to the stock, apply oil, tighten and lock all the levers. Why is oil used?
16. Set the belt on the largest pulley. What would happen if too much speed were used at the start of the turning operations? What force would cause this?
17. Set the toolrest even with the center points. Get O.K.

ing tool to cut down on the 2-in. line. Then use the small gouge and skew chisel.

22. Measure the lengths wanted for the base and the bowl part of the stick. Set the belt for the next higher speed. Form the wood as per your design.
23. Remove the toolrest and sand with No. 1 and No. 00 sandpaper. Remember that all the cutting must be done before the sanding takes place. Why?
24. Remove the pattern from the lathe. Finish cutting off with a backsaw. Smooth the ends with a file or sandpaper. Get O.K.
25. Shellac as per finish given in the contract.
26. Let the pattern dry for half an hour. Why should the pattern be shellacked?
27. Finish the pattern with fine, old sandpaper. Get O.K.
28. Determine what the casting will weigh when it is made from the pattern. This is a challenge. Can you figure out a proportion for the wood used in the pattern and the metal used for the casting?
29. Have you complied with all of the contract requirements? Is your contract written up? Have you

read all of the references? Have you made out your cost record for the material used?

30. Has this contract given you an insight into the occupation of the patternmaker? Is there a relationship between this occupation and the occupation of the foundry man or molder?
31. In the space below, draw the points of all of the turning tools you used and tell what your sketches represent.

A Contract. Possible grade: A+, A, A—.

1. Write a 300-word paper on "The Making of Candles in Colonial Days," or choose a subject related to the problem and get permission from your instructor to write on it.
2. Collect 10 pictures from magazines showing colonial candlesticks. Paste the pictures on a sheet of 8½ by 11-in. white paper and hand them in with your theme.
3. Turn in a complete cost record of material used.

B Contract. Possible grade: B+, B, B—.

1. Write a 200-word paper on "The Modern Method of Candle Making," or choose a subject related to your problem. Get an O.K. from your instructor before beginning your theme.
2. Collect 15 pictures of modern candlesticks. Paste the pictures on a sheet of 8½ by 11-in. white paper and hand them in with your theme.
3. Turn in a complete cost record of material used.

Motion Pictures as a Teaching Aid in a Trade School

Allyn C. Taylor, Vocational School, St. Paul, Minn.

WHEN it is desirable to introduce to students, operations or processes that cannot be shown them by an actual demonstration, the motion picture serves as an excellent substitute.

When continuous operations must be performed to illustrate a process, the motion picture excels any other means of demonstration. There are many good industrial films that show not only the operations, tools, machinery and the like, but in addition show, by animated diagrams, the same processes during the different stages. These films fix the principle which they demonstrate very firmly in the student's mind. They frequently make the operation clearer than if the actual operation were taking place.

In the past year the St. Paul Vocational School has shown many thousands of feet of film. The table, which is part of this article, gives the names and addresses of places where good films can be obtained. It also contains the names of the best films that we have obtained from these firms or organizations. The films are usually obtained by paying express charges for their transportation. Some organizations pay the charges one way, and still others pay all charges. When funds are not available for such a purpose they can easily be raised by including a comedy film and charging a small admission fee.

Films are more valuable for instructional purposes, when they are first viewed by the instructor, who is thus given an opportunity to prepare some form of quiz or a list of questions that are to be answered by the student to whom the picture is shown. Such preparation will arouse the student's curiosity, and will create more than just a passing interest in the picture. If a definite purpose is given to the class for seeing a picture, they are sure to get more from it.

With this idea in mind, the following form is used by the instructor for making a brief record of the film in order that its showing may be timed for better correlation with the regular classwork. By simply checking the shop or trade for which the film has a special interest, and by adding any comment that might be needed later, the instructor has a ready reference file for future use. The related subjects also are checked, and any particular principle involved may be noted also. The cards are filed in a visible card file which leaves the title of the picture, and the date shown, visible at all times. This accounts for having this information at the bottom of the card.

ST. PAUL VOCATIONAL SCHOOL

Film is of special interest to the Trade checked	✓	Comments	It correlates with these Subjects	✓	Comments
Auto			Geography		
Furniture Making			U. S. History		
Cabinet Making			Physics		
Pattern Making			General Science		
Machinist			Chemistry		
Sheet Metal			English		
Printing			European History		
Electric			Mathematics		
Carpentry			Materials of Trade		
Mechanical Drafting			Processes of Trade		
Architectural Drafting					
Watch Making					

Date Shown _____ Title _____

ORIGINAL CARD 4 BY 6 IN.

The following list of films contains some of the outstanding films that are especially desirable for use in a trade school. It is not a complete list of the films available, but those mentioned have been found to be especially valuable. They may be had by sending directly to the addresses given.

Titles	Distributors
Oxygen The Wonder Worker. Four Reels. Shows methods of preparing oxygen, and the remarkable work done by the oxyacetylene torch in cutting and welding metals.	Air Reduction Sales Co., New York.
The Henry Ford Trade School. Four Reels. Shows in detail the activities of both the academic and shop sections of the school. A synopsis of the development of the school.	Ford Motor Co., Detroit, Mich.
Lumbering. One Reel.	Ford Motor Co., Detroit, Mich.
Manufacture of Ball Bearings.	Standard Bearing Co., Plainville, Conn.
The Story of Cement.	Y. M. C. A., New York or Chicago.
Doings of Turp and Tine.	Y. M. C. A., New York or Chicago.
How Good Furniture is Made.	Y. M. C. A., New York or Chicago.
White Magic.	Y. M. C. A., New York or Chicago.
When White Paint is White.	Y. M. C. A., New York or Chicago.
Hollow Tile.	Y. M. C. A., New York or Chicago.
The Age of Speed.	The Norton Co., Worcester, Mass.
The Thirtieth Part of a Hair.	The Norton Co., Worcester, Mass.
Plaster and Plastering.	U. S. Gypsum Co., Chicago, Ill.
The Use and Abuse of Twist Drills.	Cleveland Twist Drill Co., Cleveland, Ohio.

Portable Electricity.	J. Alexander Leggett Co., New York City.
The Benefactor.	General Electric Co., Schenectady, N. Y.
Beyond the Microscope.	General Electric Co., Schenectady, N. Y.
Liquid Air.	General Electric Co., Schenectady, N. Y.
The Molder.	General Electric Co., Schenectady, N. Y.
Panama Canal.	General Electric Co., Schenectady, N. Y.
King of the Rails.	General Electric Co., Schenectady, N. Y.
Making Mazda Lamps.	General Electric Co., Schenectady, N. Y.
Power Transformers.	General Electric Co., Schenectady, N. Y.
Revelations of the X-ray.	General Electric Co., Schenectady, N. Y.
The Wizardry of Wireless.	General Electric Co., Schenectady, N. Y.
The World of Paper.	General Electric Co., Schenectady, N. Y.
The Carburetor. Two Reels. Animated Diagrams clearly illustrate the purpose of the carburetor.	Ford Motor Co., Detroit, Mich.
Wings of Progress. One Reel.	Ford Motor Co., Detroit, Mich.
The New Ford. Five Reels. Features of the new Ford car.	Ford Motor Co., Detroit, Mich.
Ford Air Service. One Reel.	Ford Motor Co., Detroit, Mich.
Ink and Adhesives. Two Reels.	Carter Ink Co., Boston, Mass.
Electricity in the Motor Car. One Reel.	North East Electric Co., Rochester, N. Y.
How the Generator Works and Why the Starting Motor Starts. Two Reels.	North East Electric Co., Rochester, N. Y.
One for Two: The Starter-Generator.	North East Electric Co., Rochester, N. Y.
The Burning Question: Ignition. Two Reels.	North East Electric Co., Rochester, N. Y.
The Story of Gasoline.	Bureau of Mines, Pittsburgh, Pa.
The Story of the Storage Battery.	Bureau of Mines, Pittsburgh, Pa.
Story of Power.	Bureau of Mines, Pittsburgh, Pa.
Story of Lubricating Oil.	Bureau of Mines, Pittsburgh, Pa.
Story of Heat Treatment of Steel.	Bureau of Mines, Pittsburgh, Pa.
Story of Alloy Steel.	Bureau of Mines, Pittsburgh, Pa.
Story of Fabrication of Copper.	Bureau of Mines, Pittsburgh, Pa.
Story of a Watch.	Bureau of Mines, Pittsburgh, Pa.
Story of Steel.	Bureau of Mines, Pittsburgh, Pa.

The following list of questions illustrates what was done to prepare the students to see the picture "Story of Heat Treatment of Steel." They were first given this sheet of questions after which they were shown the picture. A class discussion then followed, after which each student was required to submit a written report.

MOTION PICTURE "THE STORY OF HEAT TREATMENT OF STEEL"

The following questions are answered in this picture:

1. What are the physical properties required of automobile parts?
2. What are the specific physical properties required of: shackle bolts? camshafts? front axles?
3. What heat treatments give steel the following properties: hardness? softness? flexibility? elasticity?
4. What tests show the above properties?
5. In looking at steel through a microscope, what has the size of the particles to do with the physical properties?
6. How is an automatic heat-treating furnace controlled?
7. What devices are used in this controlling process?
8. What kind of flame is used in this furnace?
9. Are the parts heated from the top or bottom of the furnace?
10. What is a pyrometer?
11. What is used for quenching the heated axles?
12. How is the temperature of the quenching bath regulated?
13. What is the difference in looks through a microscope, of a piece of steel before and after hardening?
14. What is the purpose of the tempering process?
15. How is the tempering process carried out?
16. How are strains set up within the steel?
17. What is the Brinnell test for hardness?
18. What properties are required by a spindle bolt?
19. What is meant by the normalizing process? What is its purpose?
20. What is the effect of cooling rapidly? slowly?
21. What is casehardening? How is it accomplished? What is added to the surface of the steel?
22. What effect has a file upon a casehardened surface?
23. What parts of an automobile need to be casehardened?
24. What other properties are possessed by a casehardened piece other than a hard surface?
25. How is the skin-hardening process carried out?
26. What is meant by cyaniding?
27. Which method of casehardening has the deepest coat?
28. What has the depth of the impression made by the steel ball in the Brinnell testing machine to do with hardness?
29. What is a deviation indicator?
30. What effect has the science of heat treating upon the size of cars that are on the market?

Safety Education in the Shop

Geo. H. Wichmann, Greenway High School, Coleraine, Minn.

THE ever-increasing use of machine production, the almost universal use of electricity, the speed mania in business, transportation, and pleasure, the gradual increase in the amount of time allotted for recreation, the increased facilities for recreation and pleasure, combined with the "kick" the average American seems to get from taking a chance, have brought to the foreground the important problem of safety education or "safety first." Most of us never miss the water until the well runs dry, never consult a physician until we are in pain, nor have our teeth tended to until some excruciating ache develops. Neither do we give a consideration to the problem of personal safety until some accident occurs. Let the accident recur frequently enough and the result is a safety movement. Sometimes we are lucky in escaping mishaps which, according to the law of averages, should occur, in which case we have little interest in correcting hazards that result in injury. Such is human nature or psychology or whatever you may call it.

Because of the fact that injuries and loss of life during the past years have been on an increase rather than on a decrease, the problem of personal safety of the public and of the workingman has become one of the questions of the day. Labor unions have demanded adequate protection in factories, mines, and railroads. States have passed considerable legislation concerning safety practices. Safety inspectors have been appointed to see that these regulations are conformed with. Large industrial firms have organized

their own safety councils, maintaining them at a considerable expense, and working on the assumption that the safety of its employees is more important than the declaring of dividends. In case of an accident, the council immediately makes a complete investigation, determines the cause, fixes the blame, and suggests measures for its nonrecurrence. In case of neglect on the part of an employee, penalties in the form of demotion, layoff, or even loss of job, are meted out. A complete account of the accident is given to a representative group of employees attending the next meeting of the safety council. In this way the problem of preventing accidents is one of education and continually kept alive before the employees. This almost compulsory safety practice has materially decreased accidents in industrial life.

The reader cannot help but compare the infrequent accidents in industrial life with the astounding number of deaths caused by cars, railroads, and automobile collisions, swimming, hunting, canoeing, and so on. Yet in 95 per cent of these accidents, the direct cause must be attributed to carelessness, ignorance, or to the taking of a chance.

Necessarily the problem of safety education and training falls to the lot of the school. Many schools are now carrying on safety work by using safety textbooks, organizing safety councils, safety patrols, safety posters, etc. In teaching safety work in the schools it would seem that the industrial-arts departments should take the lead. They have real problems, because they deal with the machinery of industry, sharp cutting tools, high-voltage electric power, high percentage carbon monoxide gas. Hence safety practices in the industrial-arts department are highly important and should be strictly enforced.

Yet it is very questionable if the safety practices of the average school shop would compare at all favorably with that of industrial concerns. School executives are seldom interested in shop safety until a serious accident really occurs. Schools preparing shop teachers either fail to teach, or fail to put across the importance of teaching safety. The average teacher is not any too well informed concerning safety practices, and with the maze of other varied duties required of him, frequently becomes a flagrant violator of the most common of safety practices.

It is therefore our duty as shop teachers not only to protect and guard against accidents in the shop, but in a larger measure to establish a bigger objective, namely, that of developing safety habits and a respect for safety that will function outside of the school shop, in whatever vocation or avocation the student may follow.

In this article an attempt has been made to compile a list of some, but by no means all, of the most common shop hazards, and to make some suggestions for their prevention.

1. The stumbling hazard appears so simple and commonplace as to be hardly worth mentioning. In the machine shop, foundry, and particularly in the woodworking shop there is likely to be found a considerable amount of material underfoot. Keep the shop "spic and span" at all times, a place for everything and everything in its place.

2. Oftentimes maple floors in the woodworking shop becomes highly polished from friction with sawdust. Rubber

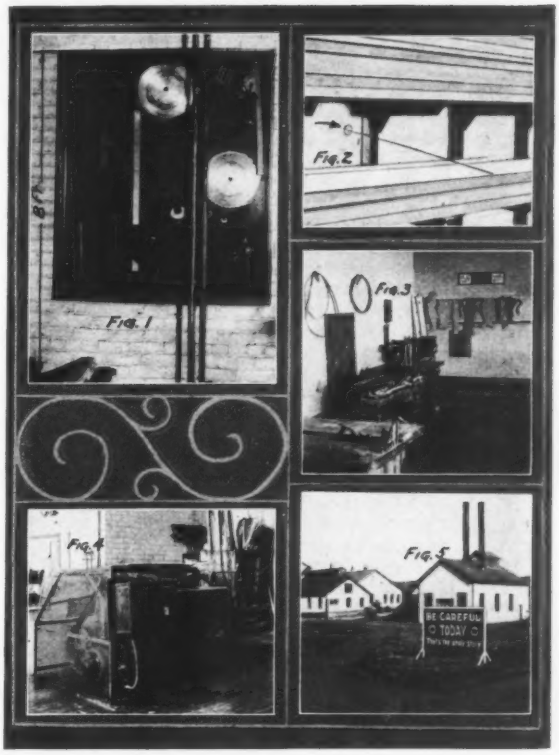


FIG. 1. Showing an improperly arranged saw panel as viewed from a safety standpoint.

FIG. 2. Showing the danger of a kickback from a rip saw. The shaft, which was about two feet long, less than a quarter of an inch square, and weighing one-half ounce, was imbedded in the mortar of a brick wall to a depth of more than one-half inch.

FIG. 3. Showing safety zones, safety aisles, rubber mats, machine guards, and safety signs.

FIG. 4. Showing guards over pulleys, shafting, and belts.

FIG. 5. Safety reminder used by the Oliver Mining Co.: "BE CAREFUL TODAY. THAT'S THE WHOLE STORY."

mats around machines prevent slipping where slips would be most dangerous.

3. Painting of safety zones and safety aisles around machines prevents congestion around machines or interference with the machine operator.

4. The danger of falling objects is a continual hazard. In our attempt to economize space, in our too-often crowded quarters, lumber weighing hundreds of pounds is piled on racks overhead. Improperly piled boards or a broken shelf bracket might cause serious results. Figure I shows an improperly arranged saw panel.

5. All belting, gears, pulleys, shafts, couplings, etc., should be provided with approved guards.

6. Never use a dull or cracked circular saw. A punch mark in the crack of the circular saw may lengthen its life, but it is hardly worth taking the chance of having a serious accident with it.

7. A splinter guard on a circular saw saves many a kickback, and should be required on all ripsaws.

8. Impress on the student the causes and danger of a kickback, be it from saw, planer, or jointer. It is in the writer's opinion one of the chief dangers of machine operation. Never stand back of, or in line with, high-speed, revolving, cutting edges. Kickbacks are not entirely preventable; the safe rule is to be out of line when they do occur. Figure 2 shows a pine shaft less than a ¼ in. square and about 2 ft. long that was thrown a distance of 25 feet and imbedded to a depth of ½ in. in the wood fiber mortar of a brick wall. The shaft itself weighed less than an ounce.

9. Square-head jointers are still in use in some schools. Most states have passed laws prohibiting their use.

10. It is usually unsafe to cut short pieces on a swing saw or to attempt to use a jointer or planer on small pieces.

11. Most states require guards on all machines; the important thing is to see to it that they are used and not shoved aside. Figure 3 shows a unique and safe guard for jointer.

12. Every new cut required of the students should first be demonstrated by the instructor. Especially is this true of cuts on the saw table.

13. Students should not be allowed the free use of machines until they have passed suitable intelligence and dependability test regarding their operation.

14. All motor-driven machines should be equipped with conduit wiring and safety switches.

15. All machines should be brought to a complete stop before oiling or making repairs.

16. Students are prone to gather around machines that are in operation. Enforcement of the safety-zone rule will correct this problem.

17. Never talk to a student while he is working on a machine. The operation he is performing demands the use of all his faculties.

18. Oil, turpentine, and finishing rags should be deposited in a fireproof waste can. Spontaneous combustion annually is the cause of loss of much life and property.

19. Gasoline and other inflammable materials should be kept around the shop only in small quantities and then only in plainly marked containers.

20. All students should be required to wear goggles when working on an emery grinder.

21. It is imperative that all high-speed emery wheels be equipped with safety collars. They should also be inspected at regular periods for cracks.

22. The wood trimmer in the pattern shop cuts off many fingers. Keep the handle of this machine locked or in the toolroom when not in use.

23. The breaking off of burred and battered edges of chisels, punches, hammers, cold cutters, and other forge tools are frequent contributors to accidents. Keep these tools in first-class condition by keeping the edges well rounded on the emery wheel.

24. With the coming of the automobile shop and running tests on gasoline engines, comes also the problem of disposing of carbon monoxide gas. A separate exhaust stack is probably the best way of disposing of these gases. Exhaust pipes should be connected directly to these stacks. Above everything, insist on fresh air and good ventilation in the autoshop.

25. Each shop should be equipped with a first-aid kit containing mercurichrome or iodine, roll and pack bandages, ammonia smelling restorative, tourniquets, etc. The safety rules of the steel corporation require immediate treatment of all wounds no matter how insignificant. School shops would prevent many infections by following this practice.

26. The prone pressure method of resusciation should be taught to all students as an effective help for electric shock, drowning, or carbon monoxide poisoning. First aid, as related to arterial cuts, should also be taught.

27. Industrial rooms are frequently located in damp basements. Here special precautions should be taken to have all electric fixtures made of approved porcelain.

28. It is a good plan to keep a bulletin board full of clippings and photographs of accidents. Accidents which have become a reality bear more weight in safety instruction, than do merely problematical accidents.

29. After all, our vocations and avocations cannot be made foolproof. Guards on machines and safety rules are invaluable, yet unusual and unlooked-for accidents are continually occurring. Clear and quick thinking are, after all, the most effective agents for safety. Certainly many of our safety rules and practices would fail were it not for an alert mind and body.

30. As a suggestion for safety posters, schools would do well to adopt the slogan used by a large industrial concern and shown in Figure 5. "BE CAREFUL TODAY. THAT'S THE WHOLE STORY."

Teaching Paper Hanging to Apprentices

Claude H. Ewing, Washburne Continuation and Trade School, Chicago, Ill.

PART III

PAPER HANGING can be very effectively taught in a school classroom with the equipment and space provided as described in Part II, page 396 of the November, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE.

One method of procedure is to assign two apprentices to each paste table as they enter the shop for the first time. Then explain to the group that each table has a certain wall surface assigned to it, and that the responsibility of keeping that surface clean and in good condition rests upon the group to whom it has been assigned. If the apprentices are permitted to work at any place which they may choose, the wall surfaces will soon be in bad condition. More time will then have to be spent preparing the surface rather than in learning how to hang paper. The assigning of a given table and set of tools also aids in checking equipment.

When the paper-hanging classes were first put in operation in the Washburne School, aprons were provided in which the tools could be carried. These aprons were given out by the instructor at the beginning of the period and checked in at the close of the period. It was quickly found that this method did not work quite as well as it should, because even with the greatest care, tools would be missing or checked in broken.

The present plan is to have a full outfit of tools on each paste table and have each apprentice check on the preceding one working at the table. Then the instructor checks at the end of the day. With this plan there is very seldom a tool missing, and very few are broken.

Should the surface assigned to the tables vary in size or shape, the groups can be shifted at stated intervals, so as to give each group a variety of experiences.

Starting the Instruction

If the class is composed of beginners it will be possible to give group instruction for a few lessons, but very soon the need for individual instruction will be evident.

As in other trades, the first instruction necessary is the proper use of the tools. It has been found advisable, however, to refrain from discussing the uses of a given tool until the necessity of using the tool actually arrives. Some information is necessary to start with, but this is quite limited. For instance, the first lesson might consist of a demonstration of the following: Testing a straightedge; sharpening a paper knife; tearing paper; placing paper on the paste table; pasting paper; folding paper; and trimming paper.

This demonstration requires about ten minutes, during which time the apprentice has learned something about the use of the knife, the straightedge, and the paste brush. He does not know how to mix paste, how to set up a paste table, or how to fasten the emery

onto the straightedge, but this information is not needed to paste and trim paper.

The group is immediately put to work. The actual handling of paper within such a short time after entering the shop causes most of the students to be enthusiastic regarding their new work.

To learn to prepare paper on the paste table required several days of patient effort, and during this monotonous period of pasting and trimming, the class can take a rest while the instructor demonstrates how to mix paste, or how to paste the emery cloth on the straightedge.

Then after a few days, instruction can be given in measuring and cutting strips of paper to given dimensions. This introduces the folding rule and its uses. When the apprentice has acquired some skill on the paste table, he can be allowed to hang some short strips on the wall, receiving instruction in the use of the smoother. This means a big step forward for him and usually causes the apprentice to become still more interested.

Next, demonstrate how to chalk a line, and the use of the plumb bob. By this time the apprentice can be required to mix paste, prepare paper, and hang short strips. Each apprentice should be required to demonstrate his ability to take care of these elementary jobs. He should then be assigned the job of hanging his first strips to a chalk line. He also should be given instruction at this time in butting the paper, keeping the short strips on the lower portion of the wall so that the shears can be used to trim the paper.

With these hand skills partly mastered, the balance of the work consists mostly of practice, coupled with related information concerning the materials which are used in doing the jobs.

In organizing the course of study for paper hanging, the type of material is the determining factor in setting up the sequence of the instructional material. Instruction can be given in the following order: Hanging plain 18-inch paper; hanging a square pattern; drop pattern; panel work, etc.

To facilitate the handling of materials in the classroom, storage bins are a necessity. The wall paper should be sorted in the storage bins so that no time is lost in securing the kind of paper that is needed for any particular job. The apprentices should be required, in most cases, to take care of issuing and caring for these supplies.

Keeping the apprentice interested is an important duty of the teacher. If interest is not sustained, paper hanging can become a very tiresome job. Interest can be stimulated by various devices, such as choosing papers with bright colors, and by calling the learner's attention to small things usually not noticed, etc.

Although the teaching job becomes one of individual instruction shortly after the class is started, yet the faster workers can be paced by assigning to them jobs which are more exacting, or by choosing papers that require more time in the hanging. In this way the instructor can continue with his class demonstrations and give each apprentice some information of value.

The whole course should be definitely planned by the instructor, with each daily lesson clearing the way for the next day. The following daily lesson plans are taken from the work given to apprentices between the eighteenth and twenty-fourth months of their apprenticeship.

Unit No. 10. Papering one panel with figured patterns.
Material: Field paper with large figure.
Plain styling.
To teach: Centering figure.
Work to be done:
1. Layout panel.
2. Prepare and paper field.
Taking care to center figure.
3. Paper style—vertical seams.

Unit No. 11. Papering two panels complete.
Material: Plain field—18 or 30 inch.
Plain style—18 or 30 inch.
Narrow band or border.
To teach: 1. The procedure of a complete job.
2. To apply the border and mitre corners.
Work to be done:
1. Paper field.
2. Paper style.
3. Prepare and apply border.

Unit No. 12. Papering two panels complete.
Material: Plain field or no figure to center.
Stripe styling paper band or border.
To teach: 1. Proper procedure of a complete job.
2. Time extra when using a stripe styling.
Work to be done:
1. Hang two panels complete.

Unit No. 13. Making panels with combination style and border.
Material: Any figure 18-inch side wall.
Border and style combined.
To teach: Use of combined style and border.
Work to be done:
1. Paper side wall solid.
2. Apply border making one panel.

Unit No. 14. Papering one panel.
Material: Figure field no large figure.
Style and band combined.
To teach: 1. Use of combined style and band.
2. Proper cutting at corners.
Work to be done:
1. Paper field.
2. Apply style and band.

Unit No. 15. Papering a panel.
Material: Styling and band combined.
Field, large figure.
To teach: Layout of panel.
Work to be done:
1. Layout panel.
2. Paper field.
3. Hang style and band.

By this time the apprentice is working as a paper hanger part of the time for his employer, or he is trying to do a job at home and has a number of questions to ask concerning the economy of materials. From the questions asked by apprentices a series of lessons were planned similar to the following:

Block: Economy of material.
Lesson No. 3: Filling back.
Material: 18-inch stripe pattern paper.
Procedure: Hang the paper in the order the stripes are numbered.

NOTE: All pieces numbered 4 are from the same strip. This is called "filling back."

A special drawing is to accompany this lesson.
Block: Economy of material.
Lesson No. 4: Vertical seams only.
Material: 18-inch pattern paper.
Procedure: Draw lines representing the seams. Number the strips to show the order in which you will hang them. Receive the instructor's O.K.
A special drawing is to accompany this lesson.
Block: Economy of material.

Lesson No. 5: Papering around a window with plain paper.
Material: 18-inch plain paper.
Procedure: Hang three strips.
Split the fourth strip.
Use two short strips over and under the window.
Hang the balance of strip four.
A drawing is to accompany this lesson.

Block: Economy of material.
Lesson No. 6: Hanging a drop pattern around a window.
Material: 18-inch drop pattern paper.
Procedure: Hang three long strips.
Split the fourth strip.
Hang five inches of the fourth strip.
Split a short strip to match over and under.
Hang the second short strip over and under.
Split the third short strip so that the balance of the fourth long strip will match.
A drawing is to accompany this lesson.

Block: Economy of material.
Lesson No. 7: Saving both time and material.
Material: Either square or drop pattern paper.
Procedure: Hang the paper as shown in the sketch.
A drawing is to accompany this lesson.

If necessary, a lesson out of turn may be given to an apprentice in order to help him with some problem that he has encountered in his work outside of school. Not every apprentice will be a paper hanger, but so long as the apprentice is interested in the work there is hope.

If possible, teach several ways of doing each operation, and if a certain method of doing any particular operation is demanded, explain to the class the reason for this method being used.

The Weight of Lines Used in Mechanical Drawings

W. W. Sturtevant, Minneapolis, Minn.

IN mechanical drawing, the object is shown by means of lines so placed that they indicate the edges and surfaces of the object. The line is, therefore, the basis of the drawing. Particularly is this true in mechanical drawing where all shading is omitted. In order that the drawing may be more easily read, standard conventional lines are used by draftsmen to show certain things. These conventional lines are shown in the accompanying figure. They are quite appropriately referred to as the alphabet of lines. The purpose for which each is used is too well known to need comment.

While some drafting rooms use a light continuous line for center lines instead of the dot and dash, and a few use red ink, the majority use the dot and dash. A check-up of drawings from 38 drafting rooms showed that 25 use the dot-and-dash line, 7 using two dots and a dash, and 6 using a light continuous line.

There should be a decided contrast between the different kinds of lines in order that the drawing may be easily and quickly read. The light lines must be so much lighter than the heavy lines showing the object, that they can be distinguished at a glance.

Usually the standard line used for the outline of the object is used as a basis and the light lines, such as dimension lines, center lines, and extension lines are made one half the weight of the outline. Invisible lines are sometimes made the same weight as the outline and sometimes lighter than the outline, but not as light as the center lines.

The weight of the standard line is sometimes set at $\frac{1}{64}$ of an inch, but some judgment may be used in making a decision. Drawings of small parts having only a few lines may be made with much heavier lines than drawings of complicated machines having many lines. Drawings of some objects made with lines as heavy as $\frac{1}{64}$ of an inch would be impossible to read even if the tendency to blot could be avoided.

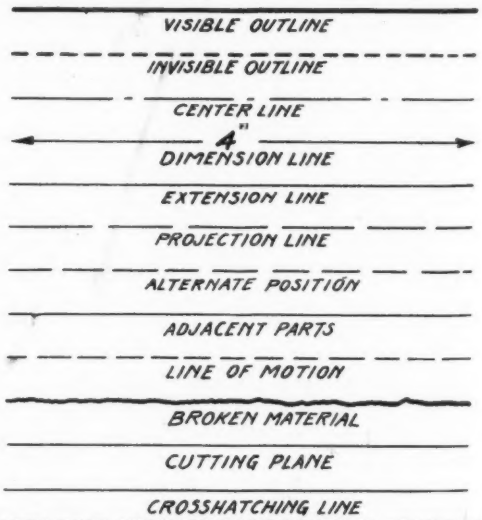
On the other hand, drawings of simple parts having few lines are much easier to read if the lines are heavier than $\frac{1}{64}$ of an inch, especially if the prints have become soiled in the shop.

The print that may be read from its position on the wall or on the bench is much better than the one that must be picked up and studied carefully by the machinist or patternmaker.

This discussion is concerned with the ink line used on drawings, and the tracings on tracing cloth or tracing paper. In the commercial drafting room it is the exception rather than the rule to ink in the drawing. The tracing is made in ink on paper or cloth from the pencil drawing and in many cases the tracing is made in pencil on tracing paper and the prints made from the pencil tracing. In some shops the original drawing is made on tracing paper and the lines darkened to make the tracing. The lines of prints made from pencil tracings are, of course, not so clearly defined as the lines on prints made from ink tracings, but the cost of the drawing and the prints is much reduced.

When drawings are not linked in but finished in pencil, the same contrast in the weight of lines is maintained. The usual practice is to darken the lines with an H or 2H pencil.

The practice of making pencil drawings instead of inked drawings may be followed in the school drafting room. More drawings may be made and a wider



LINES THAT ARE USED IN MECHANICAL DRAWING

knowledge of the subject gained, but the use of ink should be taught at some time in the drawing course as ink tracings are still used to a large extent, and the ability to make a neat ink tracing is one thing that often secures for the boy the first job in the drafting room.

Whether the practice in inking should be given the boy by asking him to ink in the drawing on paper, or make a tracing of the drawing on tracing paper or tracing cloth is a question.

White drawing paper, that will take ink well, costs more than the buff paper used for pencil work, but is little if any more expensive than the buff paper plus the tracing paper.

If the drawing is inked on paper, erasures, necessary in case of blots or errors, may be more easily made than on tracing paper.

Tracing cloth is expensive but the boy should make at least one tracing on cloth during the course.

While the experienced draftsman is possessed of some basis for forming a judgment on the correct weight of line, the schoolboy cannot decide for himself. The teacher of mechanical drawing is then confronted with two questions: First, what is the correct width of the ink line and, second, how may this standard weight be fixed in the pupil's mind so that there will be a uniform weight of line used in all of the drawings made by all of the boys in the class?

While it is not possible to give an arbitrary rule for the weight of line to be used in the commercial drafting room, it is quite feasible to settle on a definite weight of line for use in the school drafting room, at least for one term where all of the plates are drawings of simple details of the same general size and complexity.

A check-up of the drawings of this class from 38 drafting rooms shows 7 using lines $\frac{1}{64}$ in. or less, 16 using lines between $\frac{1}{64}$ and $\frac{1}{32}$ in., 12 using lines about $\frac{1}{32}$ in., and 3 using lines heavier than $\frac{1}{32}$ in.

There appears to be a decided tendency toward heavier lines and a correspondingly bolder outline.

The heavier line makes the best drawing, but the danger of blots is increased and more time must be allowed for the ink to dry.

A line between $\frac{1}{64}$ and $\frac{1}{32}$ in. is quite satisfactory for schoolwork on simple machine details. Invisible lines may be about halfway between the weight of the outline and center lines, dimension and extension lines a little less than half the weight of the outline. Where a heavy outline is used, the border may be made the same weight as the outline and not twice the weight as is sometimes done.

A sheet of paper may be ruled up with alternate light and heavy lines, one the weight of the suggested outline, the other the weight of the center and dimension lines. This sheet may be cut into slips about 1 by 3 in. and one of these slips given to each of the pupils so that he will have at his bench a sample of the desired line.

Having pupils trace drawings made by other boys, if these drawings have a good weight of line, will often show good results.

If a print is made from the boy's tracing and given to him, a marked improvement is often seen in the quality of lines, and in figures and letters as well.

Check List for Checking Teaching Technic in the Shop

H. John Paustian, Walnut Junior High School, Grand Island, Nebr.

TEACHING technic in the shop may include such factors as the teacher's personality, his ability to get along with the boys, his method of presenting subject matter, his technic as a disciplinarian and his craftsmanship. The teacher's personal habits and his mannerisms will also help to determine his success or his lack of it.

The teacher may also use this list for self-checking.

I. *Starting the Class.*
   1. Is the teacher on time?
   2. Is the class started on time?
   3. Does the teacher take the time of the class in calling the roll and reporting attendance?

II. *Demonstrations.*
   1. Does the teacher have everything in readiness for the demonstration?
   2. Does he proceed easily, skillfully, and without loss of time?
   3. Does he have the attention of the class?
   4. Is the class seated in an orderly manner?
   5. Does the teacher make sure that all the boys are getting the salient points of the demonstration before he sends them to work at their benches?
      a) Does he accompany the demonstration with clear, concise statements explaining every step?
      b) Does he provide opportunity for the boys to ask questions?

III. *Recitation.*
   1. Does the teacher have the attention of the boys?
   2. Is his questioning skillfully done?
      a) Are questions directed generally or at individual pupils?
   3. Does he secure general participation?
   4. Does he provide opportunity for the boys to take entire charge of the recitation?
   5. Is the recitation sincere and serious?
   6. Are the boys restless or in earnest?
   7. Is the subject matter worthy of the boys' time and attention?

IV. *The Teacher's Personality.*
   1. Is the teacher sincere?
   2. Is he enthusiastic?
   3. Is he well-informed?
   4. Is he good-natured?
   5. Is he firm and exacting?
   6. Does he use good English?
   7. Does he direct the boys' use of English?
   8. Is the teacher dramatic when necessary?
   9. Is he democratic?
   10. Does he call boys readily by their names?
   11. Is his voice well modulated?

V. *Shop Technic.*
   1. Does the teacher go about the shop directing the boys?
   2. Does he give enough or too much assistance?
   3. Does he help the boys individually in the use of tools?
   4. Does he give encouragement and commendation whenever possible?
   5. Is he neatly attired?
   6. Does his appearance command respect or the opposite?
   7. Does he always have a number of boys following him around the shop?
   8. Does he talk quietly to the boys or does he shout across the room?
   9. Does he seem to have the good will of the group?
   10. Are all the boys occupied all of the period?

HIGH SCHOOL RECORDER

12x18 Press

THE SCHOOL PAPER

To those unfamiliar with the printing subject, which in many ways is technical, and as an aid to vizualize the size of the school publication referred to, this arrangement is presented, showing the number of columns to the page, the type being set in 10 point Authors Roman Wide, 16 pica measure, as explained in the accompanying article, in the section that tells about the 12x18 press. By following the sug-

SUGGESTIVE AID

While any printing instructor is able to determine the size of the school paper, the purpose of presenting this lay-out is as a suggestive help to school executives who are planning to offer a course in printing, not being fully convinced what kind of equipment is best to install, and who are undecided what size the school paper should be. Often plans are made to open courses of study before instruct-

SIZE OF SHEET

Take a sheet of blank paper, cut to the size mentioned (12½x20 inches) and fold it. Now the pages are 10x12½ inches. Arrange the three columns on the page 10⅝ inches deep, which includes the heading and rule. The sheet will then show that portion occupied by the type, as well as the white margins. This gives a good working "dummy," and one can easily decide if this size is acceptable for the

12x18 Press

ANOTHER SUGGESTION

By using a sheet of the same size (12½x20 inches) four columns to the page may be had, setting the type as we have it here. This may be preferred to the wider measure. It is offered as a suggestion. This is 8 point Authors Roman Wide, set in 12 picas, with 8 point rules

PRINTERS IN EARLY LIFE

HELPFUL TO SCHOOL

Since opening the department of printing in our school additional interest has been established beneficial to the entire institution. Nothing has been so effective as a socializer as has the publishing of our school paper. Last month's issue showed decided improve-

10x15 Press

OUR SCHOOL PAPER

Here we have a product of the 10x15 press. The column measure is 19 picas wide, and 10 point Authors Roman Wide is used for the text. Note the difference of size of type shown here and the 8 point in the specimen that follows. From left to right this sheet measures 8½ inches. The full sheet is 10½x17 inches. Depth of the type page is 50 picas

THE ART DEPARTMENT

Much interest is being displayed in our art department making illustrations for the next issue of the school paper. Block designing and cutting is gaining in popularity, especially since we have a paper in which the pictures will be printed. It is one of the best methods in art development, and because of its practical application is most fascinating

EXPLANATION

Space permits showing one page heading only—the first. From left to right is given the size of one page; use paper twice the width for full sheet. Depth of sheets are given in the story. These are submitted as suggestions—make-up and size of paper that can be printed with each press mentioned. At the extreme left the size of press is given in each case. The type in this panel is 6 point Authors Roman Wide.

10x15 Press

A NARROW MEASURE SUGGESTION

This arrangement of three columns printed on an 8½x10½ sheet (full sheet is 10½x17 inches) is the maximum size for the 10x15 press. The columns are 13 picas wide with 6 point rules between. The depth of the type page is 50 picas (8 5/16 inches). The type in this column is 8 point

FOR COMPARISON

For practice work perhaps it is better for beginners to use 10 or 12 point type, but there is no question about the 8 point type giving a neater appearance in the school paper, decidedly so when the columns

STUDENT INTEREST IN JOURNALISM

Practically all the students are now contributing to the columns of our school paper, and great improvement in thought expression is manifested with each succeeding issue. Those who have charge of the publication are gaining an experience not obtainable in any other way. The editorial

8x12 Press

PAPER OF PLEASING SIZE

We have seen a number of school papers of this size that were printed on the 8x12 press. While small, the appearance is neat and pleasing. Besides, as the issue usually is of eight pages (two full sheets) the paper contains more words than most people

OUR PRINTING DEPARTMENT

The boys in the printing department are kept busy setting the type for our paper and printing the many jobs needed for the school. They show a fine interest in their work. Printing helps them in their academic studies, especially so with their language.

Pilot Press

A POCKET-SIZE PAPER

Here is the size of paper for the Pilot press. Because of the wide measure we use 10 point type. The size of the full sheet is 7x9 inches; when folded, 4½x7. The depth of type page is about 5¾ inches. Surely, there is no school too small to have its own

The School Paper

F. C. Lampe, Chicago, Ill.

THE question has often been asked, "What size is best for a school paper—what form or shape will give it the best appearance and make it convenient to handle?" If a collection were made of school papers printed in this country one would discover a decided individuality in their general get-up as to size, shape, and arrangement. And this is a good thing. There is no reason to believe that it would be better to adhere closely to uniformity in such matters. Individual tastes differ materially in every artistic undertaking; printing is no exception to the rule.

Many have written about the worth of the paper that is published in the interest of the school. Perhaps some want to justify its existence, while others are eager to convince doubtful persons that the educational institution is not perfectly organized until it has its own paper. Those who are familiar with the subject are in general accord as to its influence upon the students. Through it an added interest is maintained in the institution that might be difficult without the regular issues appearing. Those schools that have had a paper for some time would not consider its suspension. Naturally, the more people that take part in any activity, the more general will be the interest. For that reason an organization is formed among the students that is similar to the newspaper as we know it today, with its editors and reporters and a staff that attends to the business management.

Commercial printers in some instances set the type and print the paper for the school, the copy being furnished by the students, who take no other part in its production. In most cases, however, the students of the school printing department perform the mechanical work. The editors are in close touch with the progress made in getting the paper to press and often lend a helping hand, so that the paper appears on time for distribution. It is far better that the paper be printed in its entirety in the school by the students themselves. Besides, the students who do this work are getting excellent training that will fit them for bigger things when they leave school.

The value of the school paper does not depend upon its size or shape, although it may add to its attractiveness. The type faces employed will have a decided effect upon its artistic appearance. Great care is used, or should be, in selecting the type faces that are legible and appropriate for the size of the page. Careful attention also must be given to the paper stock to avoid waste.

There are schools that have a most complete printing outfit, in which there is a cylinder press. Some of these publish a six or seven column paper, the size of the city or country newspapers. Other schools, equally well equipped, have a paper which has the shape of a magazine, or perhaps 24 or more pages. Not infrequently the school annual is printed in such institutions entirely by the students. With equipment such as referred to it is possible to print a paper of almost any size desired, up to and including eight columns to the page. This does not hold true, of course, where only platen presses are available. The size of the school paper therefore, depends upon the size of the press that is available, as well as the paper stock which is to be used.

The most popular printing press of the platen type is the 12 by 18. With such a press a sheet 12½ by 20 in. is the maximum size that can be used. This size allows for the white margins, and permits three 16-pica columns to the page, with 1 pica between the columns. The depth of the columns will be 62 picas (about 10¼ in.) and 2 picas for the heading and rule under it. The measure of the type from left to right will be 50 picas (about 8¼ in.) with 3½ picas white margin at the back where the fold is, 6½ picas front margin, 4½ white at the top, above the heading, and 7 picas at the bottom. If the 12½ by 20-in. size is used, the single sheet will be 10 by 12½ in. The paper from which this is cut is found among the print papers, 26 by 40 in., there being but little waste. Four full-size 4-page papers can be cut out of a 26 by 40-in. sheet. The foregoing dimensions are offered as a suggestion. They may be altered slightly, if desired, but they will answer the purpose for school executives who want to know the approximate size and shape of a paper that can be printed with a 12 by 18 press. To better understand the layout, consult the accompanying diagram.

Setting the type in 15-pica measure with 1 pica between the columns (47 picas wide) the full-size sheet may be 12½ by 19 in., which cuts out of the standard 25 by 38-in. sheet. The depth of the type page is 64 picas (10⅝ in.).

A trifle smaller sheet may be used to good advantage by setting the type in 14-pica measure, with 1 pica rules between the columns. The full measure across the page will be 44 picas (7$\frac{5}{16}$ in.). The size of the double sheet would be 12 by 18 in., and can be cut from 24 by 36-in. stock, four out of a sheet. This size (24 by 36) can be found among print and book papers.

The type may be set in four columns to the page in 12-pica measure, with 8-point rules between the columns, by using the 12½ by 20-in. sheet. The full measure across the page will be 50 picas (about 8¼ in.). Paper stock to use is 26 by 40 in. The length of type page is 64 picas (about 10⅝ in.), which includes the heading.

Two pages at a time can be printed, and when backed will give a complete paper of four pages. Each is of convenient size and shape. The first mentioned contains 74 lines to the column when set in 10-point type, or 92 lines when 8-point type is used. By using three columns to the page, a good balance in make-up may be had. If set in 8-point, about 7,000 words will be in the 4-page issue, and about 5,500 words when set in 10-point. In setting narrow measure the 10-point type appears too large for neatness.

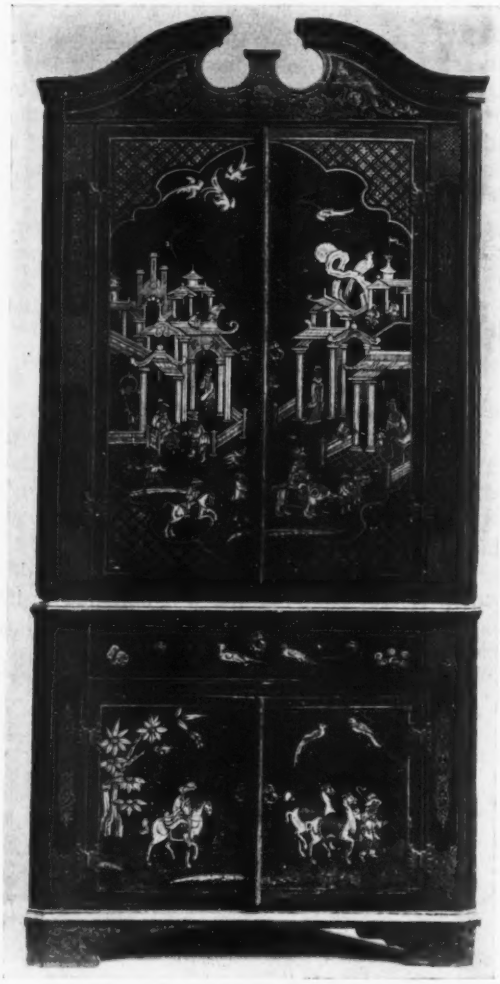
While the 12 by 18 press is, no doubt, of the most convenient size among the platen-press family with which to print the school paper, the 10 by 15 is a close second. That size press is to be found in many schools where the equipment is not as elaborate as in the larger institutions. With a 10 by 15 press the maximum paper measurement is 10½ by 17 in. In arranging for the paper, a number of different schemes may be resorted to. Taking the full-size sheet, 10½ by 17 in., the column measurement may be 19 picas, two columns to the page, with 2 picas white space between them. The depth of the type page, 50 picas (about 8 5/16 in.), will give an idea for layout. Setting the type in 13-pica measure, with 6-point column rules between, will give three columns to the page. The paper stock from which to cut these sheets may be 35 by 44-in. print paper, or 35 by 45-in. book paper, or out of 22 by 34-in. enamel book. The first two mentioned give eight to the sheet, and the latter four. There is a little waste with each of these sheets. The 8-point type will look better in the 13-pica measure, while 10-point type for the 19-pica measure will give a good appearance.

Using a smaller sheet, one that will economically cut out of the standard 25 by 38-in. stock without waste, we can produce a booklet 6 by 9 in. to the page, which allows for trim. The type would be set in 13 picas, with two columns to the page. Here again the 8-point type will give the better appearance on the printed sheet. The full width of the type form will be 27 picas (4½ in.). At times the full measure is used when set in 10-point. When setting the type in the narrow measure, using 8-point type, it would be well to select a face that is very legible, the Authors Roman Wide or something as good. This type is equal in tone value to many 10-point faces. The press will print two pages at a time. While the size of the paper is small, it may be necessary to print more than four pages each issue to record the activities of each department of the school. Not infrequently we find monthly publications of schools that have as many as 24 pages.

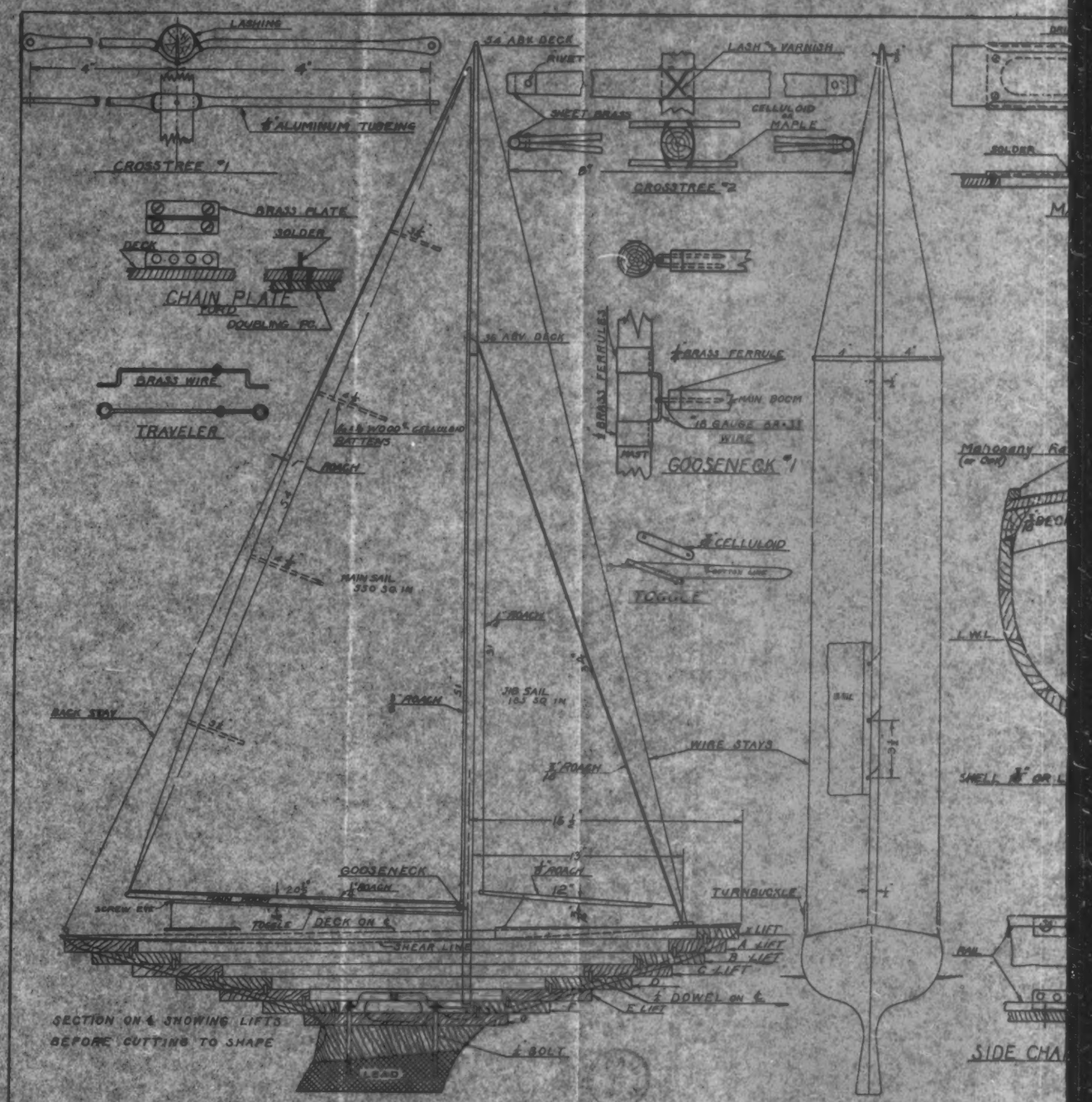
It is surprising what can be produced with the next smaller press—the 8 by 12. There are schools in which a large publication is not needed. The message to be carried to the students may be equally well done when printing a small paper. The maximum size sheet that can be used on the 8 by 12 press is 8½ by 14 in. To take in the entire sheet will permit two columns to the page set in 16-pica measure, with 1 pica white space between the columns. However, the size of the sheet is not a pleasing one; the shape of the page is bad, being 7 by 8½ in. A better size is 5½ by 8½ in., allowing for two columns to the page of 13 picas, with 1 pica between them. The open sheet will be 8½ by 11 in. The white margins—2 picas at the back, 4 picas in front, 4½ picas at the bottom, and 2½ picas at the top—are fairly well arranged. The full measure across the page is 27 picas; depth of type page 44 picas, about 7¼ in. This size of paper cuts 4 out of a sheet of 22 by 34-in. enamel book, without waste, or 35 by 44-in. print paper with only 1 in. waste, and the same size is found among the book papers. This size page, set in two columns, will contain 122 lines of 8-point type, about 750 words. For a monthly school paper, with two complete sheets, or 8 pages, sufficient information of the school's most important events may be supplied to every student. It is true that such a paper is small, but it will answer every purpose, is pleasing in shape, and will create as much interest as the larger ones. The most important thing is the reading matter that appears in the paper.

Even the Pilot press may be used for a small school paper. The size of the chase is 6½ by 10 in. A sheet 7 by 12 in. can be used, but here again it is not the shape that will be wanted. This may be cut, however, to 4½ by 7 in., and after allowing for margins, the type may be set 22 picas wide, one column to the page. The depth of type page will be 35½ picas (about 5¾ in.). Naturally, it will take longer to print an edition with the Pilot press but it can be done quite well, although of small size will not be without interest to the students.

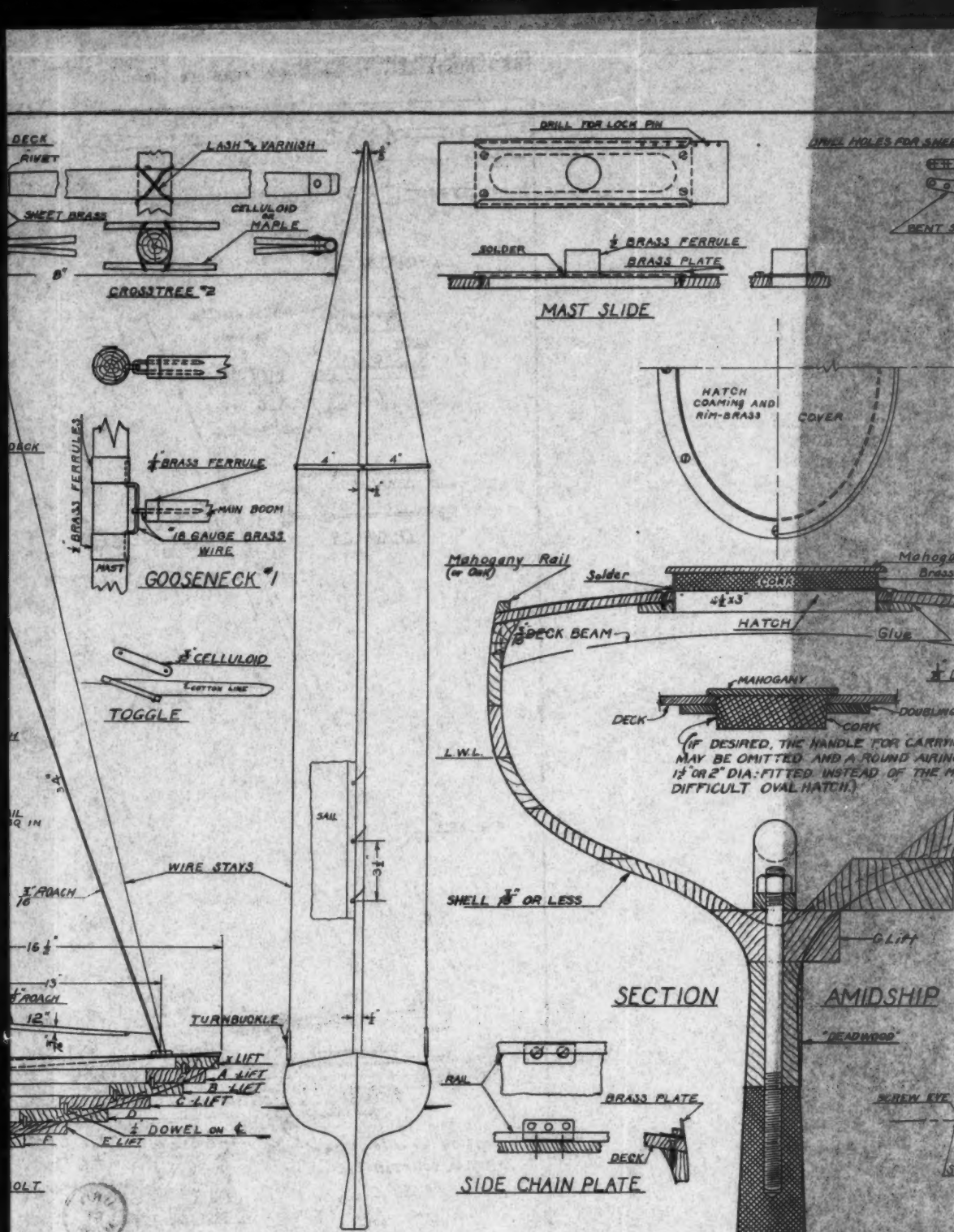
The cost of a printing outfit depends upon the equipment and materials. A school paper may be had with any of the presses mentioned, and a great deal of money is not required to buy some of them.



ENGLISH 18TH CENTURY CORNER CABINET AT THE METROPOLITAN MUSEUM OF ART, NEW YORK CITY.



Designed by A. M. Youngquist, Toledo, Ohio.


DECK
RIVET
LASH & VARNISH
SHEET BRASS
CELLULOID OR MAPLE
8"
CROSSTREE #2
DRILL FOR LOCK PIN
SOLDER
½ BRASS FERRULE
BRASS PLATE
MAST SLIDE
HATCH COAMING AND RIM-BRASS
COVER
½" BRASS FERRULES
½" BRASS FERRULE
½" MAIN BOOM
18 GAUGE BRASS WIRE
MAST
GOOSENECK #1
Mahogany Rail (or Oak)
Solder
CORK
½x3
HATCH
Glue
DECK BEAM
MAHOGANY
DECK
CORK
L.W.L.
SAIL
WIRE STAYS
SHELL ⅛" OR LESS
C.L.I.F.T.
SECTION
AMIDSHIP
"DEADWOOD"
TURNBUCKLE
X LIFT
A LIFT
B LIFT
C LIFT
D
½ DOWEL on ℄
E LIFT
RAIL
BRASS PLATE
DECK
SIDE CHAIN PLATE
SCREW EYE

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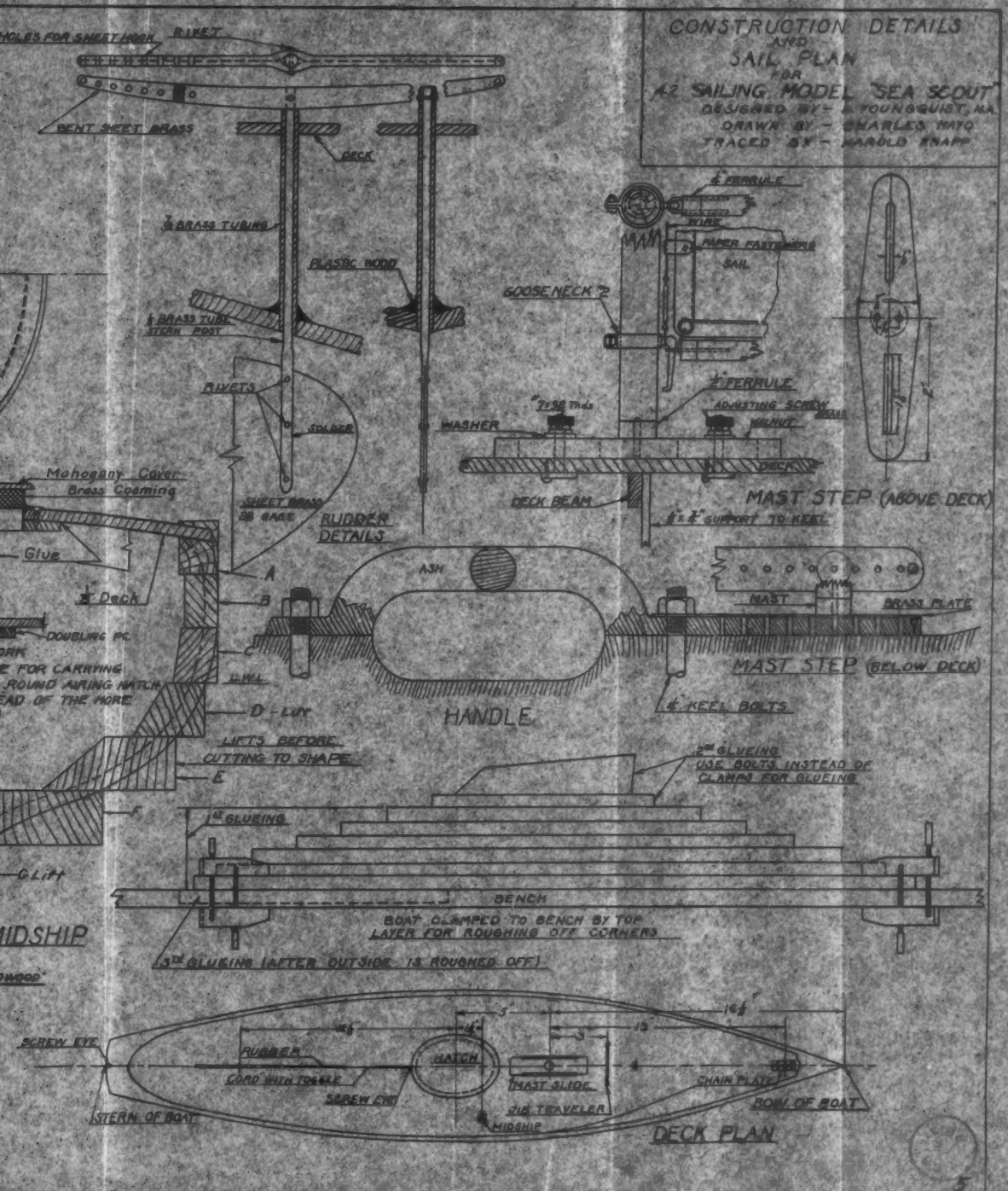
CONSTRUCTION DETAILS AND SAIL PLAN FOR A2 SAILING MODEL "SEA SCOUT"

DESIGNED BY - A. YOUNQUIST, M.A.
DRAWN BY - CHARLES MAYO
TRACED BY - HAROLD KNAPP



For Description See Page 69, Industrial-Arts Magazine, February, 1929.

TRACING SUPPLEMENT No. 125
THE INDUSTRIAL-ARTS MAGAZINE
FEBRUARY, 1929

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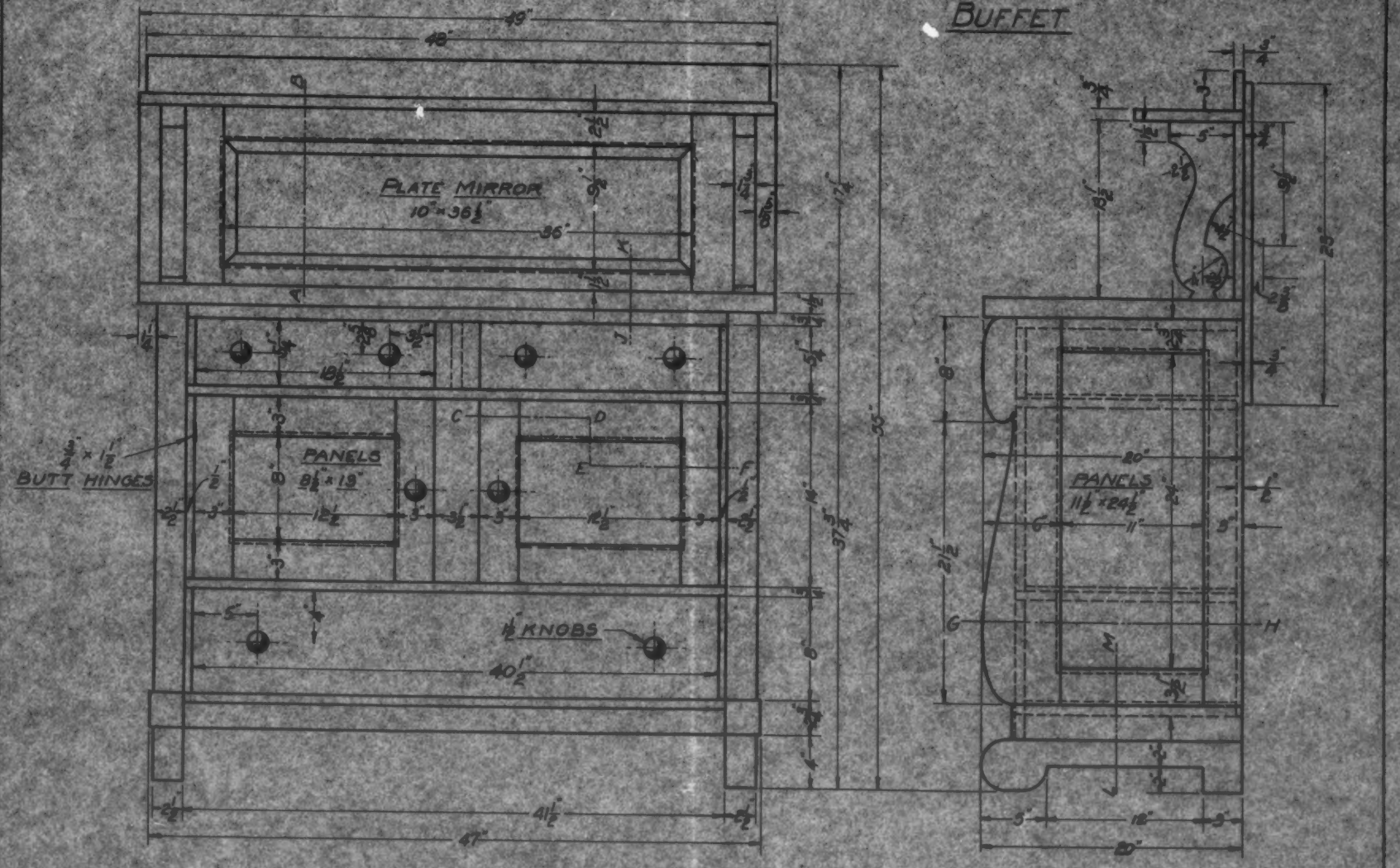
BUFFET



Designed by Wm. A. De Vette, Erie, Pa.

For Description See Page 72, Industrial-Arts Magazine, February, 1929.

TRACING SUPPLEMENT No. 126.
THE INDUSTRIAL ARTS MAGAZINE,
FEBRUARY, 1929

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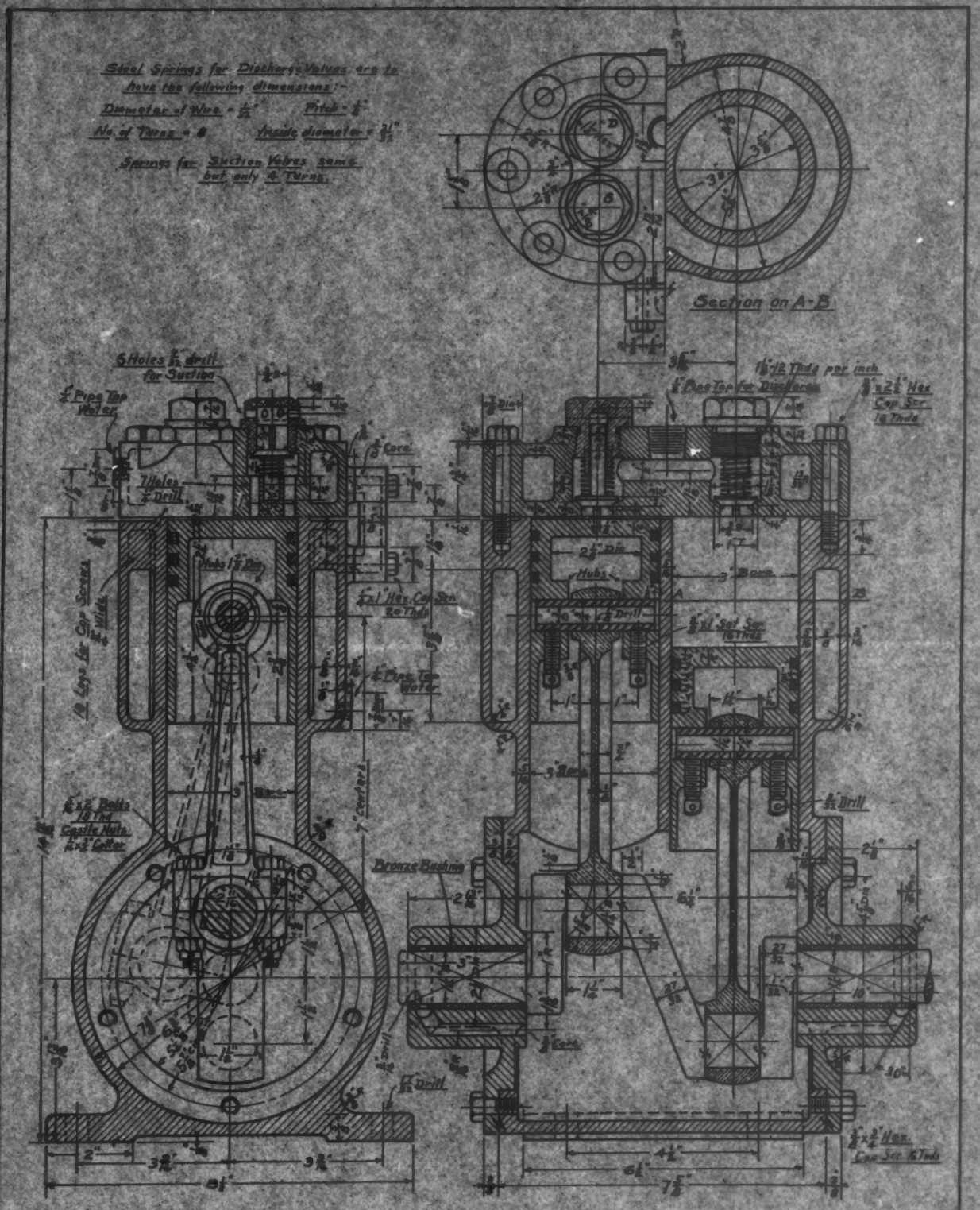

Steel Springs for Discharge Valves are to have the following dimensions:-
Diameter of Wire - 1/32"
Pitch - 1/8"
No. of Turns - 6
Inside diameter - 21/32"
Springs for Suction Valves same but only 4 Turns.
Section on A-B
6 Holes 1/4" drill for Suction
1/4" Pipe Tap Water
1/8" Core
7 Holes 1/4" Drill
Hubs 1 1/2" Dia
4 Legs for Cap Screws
1/4" Hole
1/4x1" Hex. Cap Scr. 16 Thds
1/4" Pipe Tap Water
7" Centers
1/4x2" Bolts to the Castle Nuts
1/4x2" Cotter
Bronze Bushing
1/2" Drill
1 1/2-12 Thds per inch
1/4" Pipe Tap for Discharge
3/8"x2 1/4" Hex. Cap Scr. 16 Thds
2 1/2" Dia
Hubs
3" Bore
1/2" Drill
5/16"x1" Set Scr. 16 Thds
1/8" Core
1/2" Drill
3/8"x3/4" Hex. Cap Scr. 16 Thds

WATER-COOLED AIR COMPRESSOR

U. OF MICH.

Designed by George Ellerson, Milwaukee, Wis.

For Description See Page 73, Industrial Arts Magazine, February, 1929.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

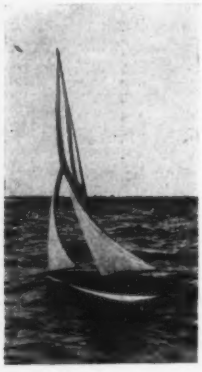
Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

THE SEA SCOUT
A 42-IN. SAILING MODEL YACHT

A. M. Youngquist, Waite High School, Toledo, Ohio

(See Supplements No. 124 in this issue, and No. 127 in next month's issue.)

The late fall is a good time to begin building a model yacht for the next season's racing. It is an interesting hobby for the shut-in winter months. As a school-shop project, model building is unexcelled as it combines instruction with enthusiastic interest. To the average boy, nothing gives more pride of possession and of accomplishment than a beautifully constructed and finished yacht, especially if the yacht proves a winner in a race.



The competitive element is present in building the model as well as in the racing. Maintaining model yacht clubs is a splendid club activity for boys. Clubs may affiliate with The National Model Yacht Association, which will supply racing rules and other data. A new magazine called The Model Yacht is being published in Washington, D. C., which is of interest to model enthusiasts.

Morrison R. Waite High School, Toledo, Ohio, has had a successful model yacht club for five years. During this time models ranging in size from 20 to 72 in. have been made in the drawing room and shops of the industrial-arts department, and tried out in races held by the club. The most successful model from a school project standpoint has been the 42-in. model, plans of which are shown in Supplements No. 124 and 127. The model has been adopted by the Toledo Model Yacht Club for junior-member competition. It has also been recommended as the standard for the model-building test for Sea Scouts. Dozens have been built by high-school boys and they have proved to be very fast, and are easily handled. The average cost of materials to the boy is $4.

The hulls are constructed on the "bread and butter," or lift method, which means that 7 layers of water planes must be accurately cut to the designed water lines and then glued together. These layers must be planed smooth and true, exactly ¾ in. thick. The best stock to use for the models is well-seasoned, clear white pine or sugar pine without checks. Phillipine mahogany, though slightly heavier than white pine, is also a suitable wood that makes a beautiful model in a natural finish. Some of the Waite models were built with mahogany above the load water line and white pine below.

It is advisable to make paper patterns of the water planes from full-size plans or by fairing the lines from a table of offsets or half-breadths. From full-size plans, half patterns can be made by (1) tracing the lines, (2) pricking through the water lines at intervals of about an inch, with a pin or dividers and drawing lines through the prick points, (3) by transferring water lines by means of carbon paper and a stylus.

Patterns may also be made by fairing the lines from the off-sets or half-breadths given in Table I. Establish center lines and accurately locate sections or station lines 2$\frac{29}{32}$ in. apart. On the station lines measure from the center line the half-breadths given in the table, and with thin wood strips or splines bent to pass through these points, draw in the water lines.

Fix accurate center lines on the wood and lay out water lines from the patterns. It is advisable to transfer the section or station lines to the wood also in order to locate each layer with respect to every other layer. In other words the position of the midship section on each layer must coincide. One-fourth inch dowels are fitted on the center line at both ends which fixes the relative position of each layer and prevents any slipping or inaccuracy in gluing up. Care should

THE SEA SCOUT FROM THE SAWED-OUT LIFTS TO THE ROUGHED-OFF MODEL. THE MODEL YACHT CLUB, WATERTOWN SENIOR HIGH SCHOOL, WATERTOWN, MASS. JOHN BLACK, INSTRUCTOR

HALF-BREATHS OUT FROM CENTER LINE

STATIONS	DECK	A-W.L.	B-W.L.	C-W.L.	L.W.L.	E-W.L.	F-W.L.	G-W.L.	D-W.L.	HEIGHTS ABOVE BASE: SHEAR LINE	PROFILE
F. P.	0									10	10
1	7/16	5/32								9 11/32	9 7/16
2	1 13/32	1 1/16	23/32							9 1/32	7 1/8
3	2 1/16	1 13/32	1 11/32	1 3/16	0					9 5/16	7
4	2 15/16	2 3/16	2 5/16	1 11/32	1 11/16	3/16				9 1/16	6 23/32
5	3 3/32	3 1/16	3 1/16	3 1/16	2 7/16	1 13/32	1/4			9 1/32	5 7/16
6	3 11/32	3 11/32	3 9/16	3 13/32	3 3/16	2 13/32	1 13/32	1/4		9 1/32	4 3/16
7	4 3/32		4 3/32	4 1/16	3 3/16	3 3/32	2 3/32	25/32	5/16	9 1/16	0
8	4 1/16		4 3/32	4 1/32	4 1/16	3 11/32	2 3/16	13/16	11/32	9	
9	4 1/16		4 3/32	4 1/16	4 1/16	3 13/32	2 7/16	23/32	7/16	8 31/32	
10	4 3/32		4 1/32	4 1/32	3 29/32	3 1/32	1 1/2	1/4		8 15/16	0-4 3/8
11	3 27/32		3 1/16	3 13/16	3 7/16	2 3/4	3/16			8 15/16	5 3/8
12	3 5/16		3 3/16	3 11/32	2 15/16	1/8				8 5/32	6 1/16
13	2 31/32		2 15/16	2 11/32	0					9 3/32	7
14	2 7/16	2 3/16	2 1/32							9 3/32	7 13/16
15	1 13/16	1 5/16								9 1/16	8 9/32
TRANSOM	1/2	1/2								9 1/2	9 1/2

DISTANCE OF W.L FOR'D OF STATIONS ON ℄

STATIONS	DECK	A-W.L.	B-W.L.	C-W.L.	L.W.L.	E-W.L.	F-W.L.	G-W.L.
1	13/16	1/32						
2			1 1/8					
3				2 7/16	0			
4						1/32		
5							1/2	
6								11/32
11								2
12							2 1/2	
13					0	2 11/16		
14				3/16				
15			11/32					

STATIONS SPACED 2 25/32"
WATER LINES SPACED 3/4"
DRAUGHT 7"
LEAD 5.3 LBS.
DISPLACEMENT 390 CU. IN.
LENGTH OVER ALL 42"
LENGTH L.W.L. 27 13/16"
BEAM L.W.L. 8 1/8"
SAIL AREA 735 SQ. IN.
RATING 22"

TABLE I

be taken not to make the dowel holes too deep as they may then come through when the outside corners are pared away in the final shaping of the hull.

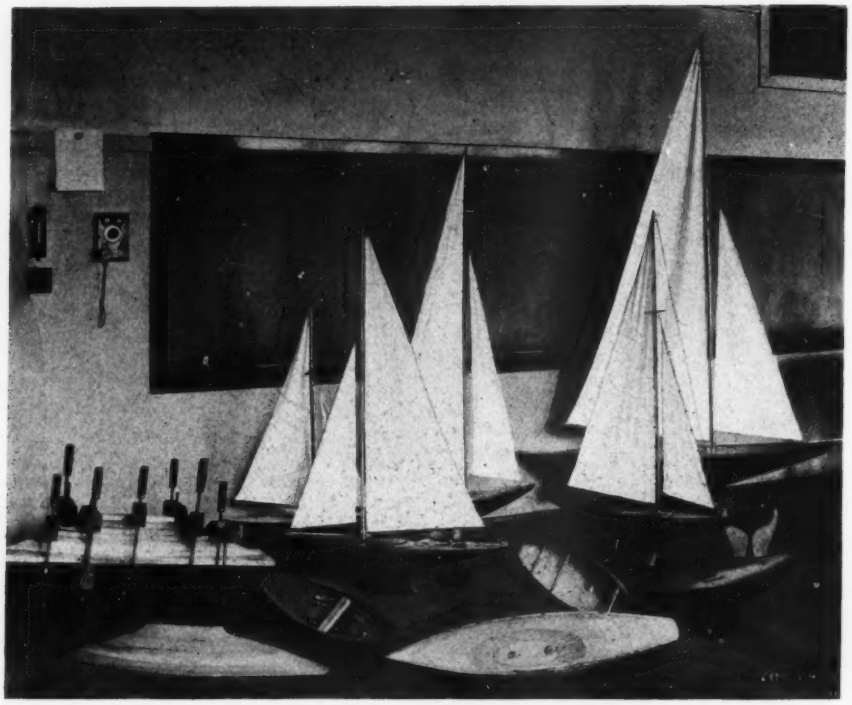
Draw on each lift, the line for cutting out the interior, using the dotted lines on the plan. Saw out the interior of the lifts to minimize gouging after it is glued up. Leave enough stock for at least ½-in. gluing surface between each subsequent layer. Leave an inch or more at the ends. The sawed-out interiors of the larger lifts can be used for the smaller lifts.

A waterproof (casein) glue, mixed according to the manufacturer's directions, should be used. Make a careful trial clamping before gluing, using wood hand screws. One layer may be glued on at a time if the number of clamps is limited. If hand screws are not available, clamping pressure may be obtained by using strong backs and bolts for tightening. Care should be taken not to apply too much pressure, as this may crack a lift.

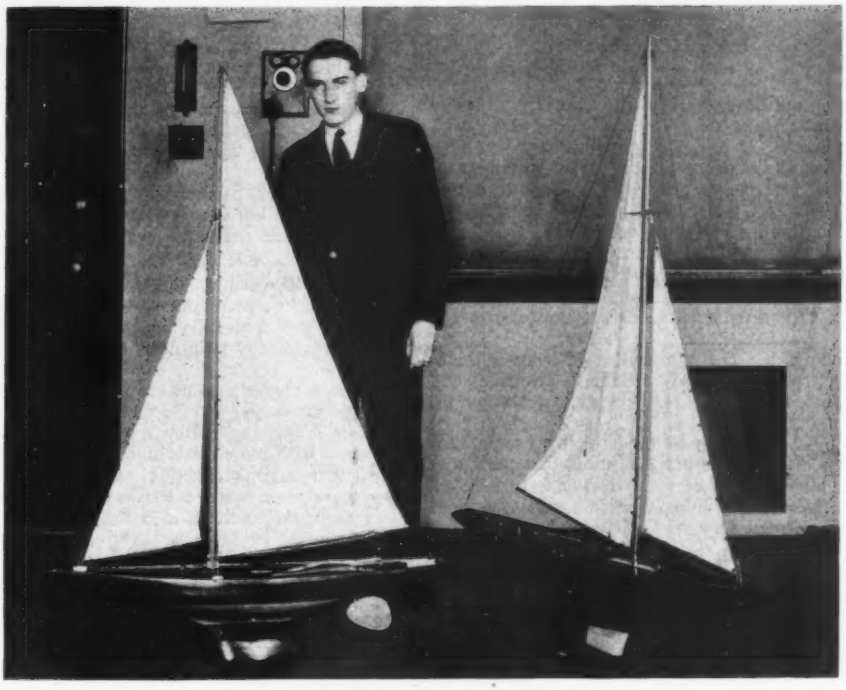
When all of the lifts have been glued together, and after the glue has hardened, fix the model in a vise, or clamp to bench top and pare off the corners on each lift with a chisel, then gouge and plane each down to the lift edge and sand smooth. This should give the correct design or shape to the hull. It is sometimes advisable to make cardboard templates from sections on the body plan at stations 4, 6, 8, etc., for testing the model form. Leave the bottom lift with square edges for securing in the vise for gouging out the interior.

In gouging out the interior, care must be taken to work with the grain of the wood. Test often so as not to cut through the hull. Holding the hull over a strong light will show if any part of it is getting dangerously thin. Plastic wood is useful in repairing any defects in the hull. It also may be applied over seams on the inside of the hull, if the gluing has been defective.

The next step is to glue on the "dead wood" portion of the keel using ¼-in. keel bolts instead of clamps. Glue on the top half of the forward lift. This may be in two pieces, mitered on the center line to save material. Finish gouging the interior, and shape the outside to the dead wood of the keel. To obtain the sheer line, lay out at each station, the points of the sheer line from water line *A*. (See profile on line plan, Supplement No. 127, March, 1929, INDUSTRIAL-ARTS MAGAZINE). Bend a thin strip of wood or spline through these points and draw in the sheer line. The weight of the finished hull without the lead keel should be about 2 pounds. The finished lead keel should weigh about 5.3 pounds. To make the lead keel first, make a split wood pat-



THE "SEA SCOUT" IN VARIOUS STAGES OF PROGRESS



THE FINISHED "SEA SCOUT"

tern which is then molded in a sand or plaster-paris mold and the molten lead poured into the mold. Detailed information on making split patterns and molding may be found in any book on patternmaking. The cast lead keel should be smoothed and accurately fitted to the wood hull with ¼-in. holding bolts. The bolts may be tapped into the lead, or holes may be drilled all the way through the keel and the bolt heads countersunk in the lead. The lead should later be trimmed away to secure the correct trim, and to make the yacht float on the designed load water line. A plane or any cutting tool may be used on pure lead without much injury to the tool. A wooden handle for carrying the model may be fitted so that the keel bolts pass through it as shown in Supplement 124. This handle is desirable, but it is not as essential as it is on larger models. Use a generous supply of white lead in the bolt holes and on all joint surfaces. A 5/32-in. brass tube is fitted for the rudder. Threading the outside of this tube and turning it into a hold slightly smaller in the wood, insures a tighter job.

The wooden skeg just forward of the rudder should be fitted for the best racing results. Younger, or less skillful boys sometimes find it difficult to get a good job on this skeg, and it may be omitted if desired.

Deck beams, cut to the proper camber curve, are secured with brads and glue. The interior of the hull should be painted with two coats of white lead paint before the deck is fitted.

The deck is made of one piece of ⅛-in. clear white pine or mahogany. Before it is secured in place, it is advisable to glue on 5/32-in. doubling pieces where necessary to reinforce deck openings or fittings. The underside of the deck should also be painted to prevent it from warping when it becomes wet. The deck is fastened to the hull with fine screws or brads, and glue. A thin mahogany or walnut rail may be fitted for the sake of appearance, if desired.

When the hull has been sanded smooth, a thin priming coat of white lead and oil is applied. Care must be taken not to paint out the load water line. A narrow stripe of contrasting color is usually painted at the load water line, between the top side paint and the bottom paint. This stripe is called the *boot-top* and is shown in Supplement 127. A strip of adhesive tape, cut to the boot-top's measurements, may be applied to the hull while painting above and below, when removed it leaves a clear-cut line of the desired width for the boot-top paint. The models may be painted, enameled, varnished, or lacquered in any desired color combination. One of the most attractive Waite models was built of mahogany, with the top sides filled light brown, varnished, and rubbed, and with a marine-green bottom and gold bronze boot-topping. Another attractive combination is a pine deck in natural finish, mahogany or walnut rail, white-enameled top sides, red boot-topping, and marine-green bottom.

The mast and booms are made of clear white pine or spruce planed square to the required dimensions, then the corners are planed off to an octangonal shape, and finally the remaining corners are planed off and sanded smooth and round.

The sails may be made of Egyptian spinnaker cloth, balloon cloth, or Lonsdale cambric. Two-ounce spinnaker cloth is very satisfactory and may be procured through any canvas dealer. In making the pattern for the sails, a convex curve or roach should be made on each side with its maximum point located where shown in Supplement 124. Allowance should be made for a ¼-in. hem. At Waite High School the sails are sewed in the girls' sewing classes. An eyelet punch is used to insert metal eyelets in the corners of the sails.

The fittings are made of brass, lacquered bright or nickel plated. The design of the fittings may be varied as the builders' ingenuity sees fit. The fittings shown have proved to be very satisfactory and are easy to make. A metal vise, tinners' snips, hand drill, soldering iron, metal saw, pliers, files, and emery cloth, are sufficient equipment for making the fittings. All of the fittings are made by the students except the turnbuckles.

It will be noted that the mast, by means of the slide, may readily be moved fore or aft so as to obtain the correct balance of the sails with respect to the hull. This balance is found by trial in sailing under different wind conditions. The mast may be stepped on top of the deck if desired. This is a simpler arrangement but not as satisfactory as when fitted through the deck.

A stand for mounting or supporting the yacht, also should be made. It may consist of a flat baseboard about ½ by 7 by 14 in., with an upright support at its center cut to the shape of the hull amidships extending from the keel to the load water line.

Practice in sailing the models is as essential as practice in any sport. Repeated trials, tuning up, and experimental adjustments are fascinating training for success in model racing.

A BUFFET

Wm. A. DeVette, Erie, Pa.

(See Supplement No. 125 in this issue, and No. 128 in next month's issue.)

The supplements furnished herewith illustrate a buffet which is an excellent project for a student who is pretty well advanced in woodwork. It has been designed with the idea of ease in assembling as the prime factor. Most large articles of furniture built in the school shops are so designed that they must be assembled piece by piece and become very cumbersome to handle long before they are completed.

This buffet may be built in units, which can be completely finished to the final sandpapering before the assembly. It is composed of the following units: A base, two sides, three frames, the top, mirror back, doors, drawers, and a back.

The top, while it has the appearance of being solid, is in reality built up, thus reducing the weight. The sides and doors are also paneled, thus still further reducing the weight of the buffet.

Any good cabinet wood may be used for this project, but in selecting the wood it must be borne in mind that the buffet should match the table and chairs with which it is to be used.

This project offers excellent practice in reading drawings and in making out a bill of material. The mirror should be ordered early enough so that the student will have its exact measurements to work from in making the mirror back.

WATER-COOLED AIR COMPRESSER

George Elleson, Milwaukee, Wis.

(See Supplement No. 126.)

The fully dimensioned assembly drawing of a water-cooled air compressor affords a most excellent drawing problem in detailing the various parts, and from them making a general drawing of two or more views.

This drawing is taken from a well-known commercial compressor and illustrates the modern idea of compressor design.

Compressors of this type are used in public garages for furnishing compressed air for tire inflation and for cleaning purposes.

This drawing will furnish enough detail-drawing material to fill three or four average-size sheets. It is advisable not to crowd too many parts on one sheet, but rather to make fewer parts, but more views of each part, so as to clearly bring out all details of the various parts.

One of the sheets should contain a complete bill of material giving size, kind of material, and number required for each item.

Each detail part should have an identification number or letter in the bill of material. This same symbol should also appear near the particular part detailed.

AN AID IN TOYMAKING

Edward E. Parlin, Lawrence, Mass.

For many years the writer had difficulty in getting an enamel which would dry quickly and enable the boy to keep busy with his toy painting. The cost also entered into the problem.

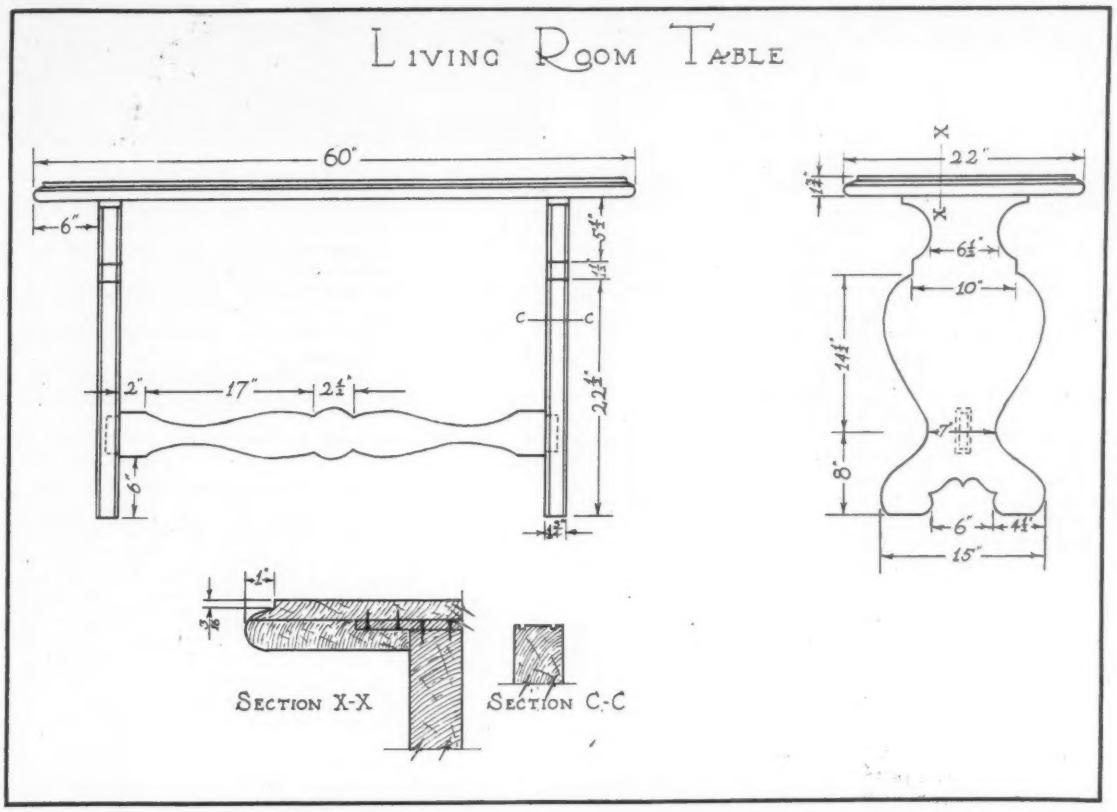
After trying a number of substances which would mix with white shellac to produce a white glossy, quick-drying varnish, it was found that a substance called nu white mixes perfectly with the shellac, and that one or two coats over new wood give a good covering, which lasts for years. Further experimentation showed that with this white shellac varnish as a base, the addition of a few grains of red, purple, blue, yellow, green, or black would give all the colors of the spectrum. Black is available by mixing orange shellac and nigrescent.

LIVING-ROOM TABLE

J. I. Sowers, Director of Vocational Education, Miami, Florida

Nearly every boy who has any sort of shop ambition, arrives at a time when he wants to make a living-room table for his home. This is a very commendable ambition, but the difficulty often is in finding a model that the boy can make acceptably, and one that embodies the modern lines of furniture design. The table presented here is one that is within the ability of a student able to do fairly good shopwork. It can be made without the use of any decorations, or it may be highly decorated with hand carving, as shown in the photograph. Where a student is not able to do hand carving, he

LIVING ROOM TABLE. J. I. SOWERS, MIAMI, FLA.



may procure the ordinary commercial ornaments which will fit into the design of this table very acceptably. The model shown in the illustration has very graceful lines, and if it is made with an ordinary degree of skill, it will fit into the furnishing of any home. The table may be made of oak, or mahogany.

A PRINTSHOP PROJECT

G. R. Skinner, Buffalo, N. Y.

The game described herewith, presents an interesting use for the scrap stock which accumulates in every school printshop. The game may be played by one person alternating the teams at bat, or by two persons, each representing a team.

The deck consists of 52 cards variously marked as shown:

Cards Required	*Plays*
12	FLY, OUT
8	SINGLE Scores a man from second
6	2 BASE HIT Scores men on 2nd and 3rd
4	BASE ON BALLS
4	STRIKE OUT
4	SACRIFICE FLY Advance all runners one base
2	DOUBLE PLAY Batter and man nearest home are out
2	SACRIFICE BUNT Advance runners one base
2	BUNT Out at first
1	OUT ON BASES Man nearest home is touched off base—OUT

SCORE CARD									
	1	2	3	4	5	6	7	8	9
Visiting Team									
Home Team									

SAMPLE OF PLAYING CARD. ORIGINAL CARD 2½ by 3¼ IN.

1	HIT BY PITCHER Batter takes base
1	OUT Hit by batted ball
1	BUNT Safe at first

1	**TRIPLE PLAY** Batter and two men nearest home are out
1	**BALK** Batter takes base
1	**3 BASE HITS** Scores all on base
1	**HOME RUN** Counts only as a double if men are on base

Directions.

1. Shuffle the pack.
2. Place face downward between the two players.
3. Visiting team goes to bat first.
4. Player draws cards one at a time and keeps track as directed by cards until 3 men are out.
5. Opponent does likewise.
6. Nine innings make a game.

A CAKE BOX

Charles E. Klepper, Baltimore, Md.

Last year I was asked to make a box in which a fruit cake might be kept. With this request came the suggestion that some means be provided for taking the cake from the box without putting the fingers into the icing or breaking the cake. The box, with its handy cake lifter, described herewith is the result of this request.

The construction of the box and lifter is outlined in three sections—body, top, and lifter. The body of the box will be described first.

The Body

1. Cut to size, two pieces of tin 5½ by 16¼ in. The sides of the box are made in two parts. See drawing Figure 2.
2. Lay off both pieces with allowances for wire, grooved seams, and burred edge, and notch the corners.
3. Place in bar folder, fold the sides first in opposite directions, and then fold the top for No. 12 wire. Fold the other piece similarly, and take care to have the two pieces folded in such a way that the folds for the grooved seams will hook together, and the edges for the wire are both turned on the same side.
4. Insert a piece of No. 12 copper coated wire in both pieces, starting about ½ in. back from one end, and projecting ½ in. out at the other. Turn down the edge in the wiring machine.
5. Place each piece in the slip-rolls, and form them to semicircular shape, with the wire on the inside to allow the top to fit more closely.
6. Hook the seams together and groove at the opposite sides of the box. The seams may be soldered on the inside if it is desired.

THE FINISHED CAKE BOX.

7. Burr up a ⅛-in. edge on the bottom for a double seam.
8. Put on a triple bead 1 in. from the top of the box to the center of the bead.
9. Determine the diameter across the bottom of the cylinder.
10. Lay out and cut a circle of this diameter, allowing $\frac{3}{32}$ in. for burring.
11. Burr up the edge, slip it over the burred edge on the box, set the edge down, and complete the double seam.

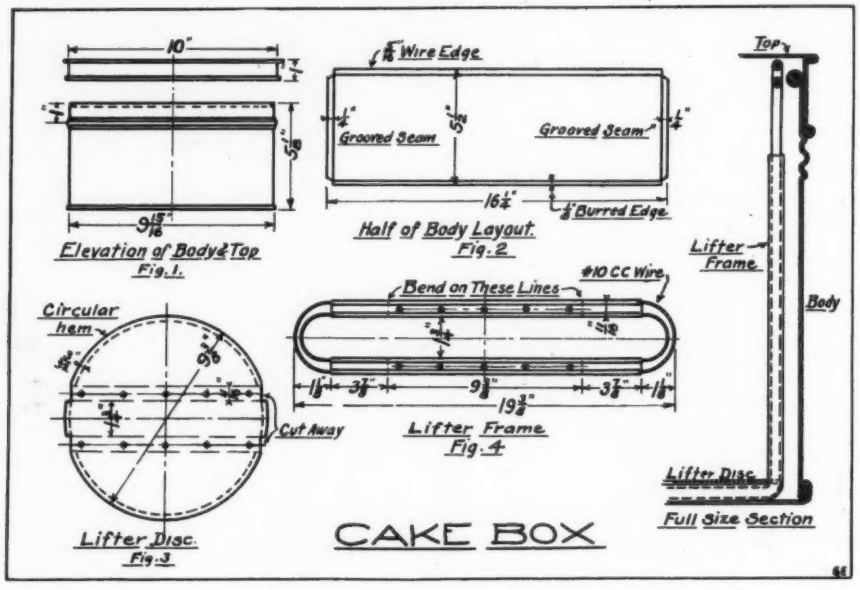
This completes the body.

The Top.

1. Calculate the circumference around the wire edge of the box, and then add ¼ in. on both sides for a grooved seam. This is for the rim of the top, which can be made in one piece. The height is determined by finding the distance from the top of the box, to the middle of the bead (one inch), and adding to this ⅛ in. for burred edge and $\frac{1}{16}$ in. for wire edge. This piece is cut diagonally across a 20 by 28-in. sheet of tin. There is practically no waste, as the two pieces left can be used for other work.
2. Fold the two ends in opposite directions.
3. Turn one edge for wire. If a bar folder of sufficient length is not available, the metal edge of a table, or a turning machine, can be used for this purpose.
4. Insert a piece of No. 12 wire in the same manner as was done in wiring the body.
5. Form to cylindrical shape and groove sides.
6. Burr up ⅛ in. on other edge from the wire, and in the same manner as was done for the body. Measure for the top, cut out and burr up a $\frac{3}{32}$-in. edge. This edge is set down over the edge on the rim, but is NOT double seamed, as this protruding edge is helpful in taking the top off the body.

The Lifter.

1. Cut out a disc 9$\frac{1}{16}$-in diameter. Burr up a $\frac{3}{32}$-in. edge. Turn this edge down, completing a circular-hemmed edge.



2. Lay out the disc as shown in Figure 3, and punch the required holes.
3. Cut two pieces of tin 1⅞ by 15½ in.
4. Fold the long sides of these two pieces, this edge being large enough to accommodate No. 10 wire.
5. Punch holes in these two pieces for 1¼-lb. rivets, the holes to correspond to those punched in the disc.
6. Fasten the two pieces to a bench by driving nails through the holes into the bench with the pieces parallel and about 1¾ in. apart, measured between the inside edges.
7. With a piece of No. 8 wire, 42 in. long, start in the middle of one outside edge, take it out to the end of the strip, and then curve it around to the outside edge of the other piece. Continue the wire through this edge until the end of the strip is reached, then curve it around as on the other end, and bring it finally to the middle of the first piece, where the wire was originally started. (See Fig. 4.)
8. Turn the edge over the wire on the wiring machine. (Note: The top of the curve at each end should be 1⅛ in. from the end of the strips of tin.)
9. Start a piece of No. 8 wire in the middle on the inside edge of one of the strips, carry it through to the end of the strip, curve around until it just touches the inside of the curve of the first piece of wire. Continue this wire in the same manner as in the case of the first piece, until the starting place is reached. This edge will have to be turned over with the pliers, as the wiring machine cannot be used. The inner piece of wire should touch the outer piece at the curve on each end.
10. Bend up the two strips (with wire on the outside) at the proper places (See Fig. 4) so that this frame will easily slide down into the cake box, and the top of the frame will not project above the wire of the body.
11. Rivet the frame to the lifter disc, with the circular-hemmed edge facing the frame.
12. Using a fine piece of copper wire, wrap the meeting places of the two pieces of No. 8 wire at both ends of the handles of the lifter.

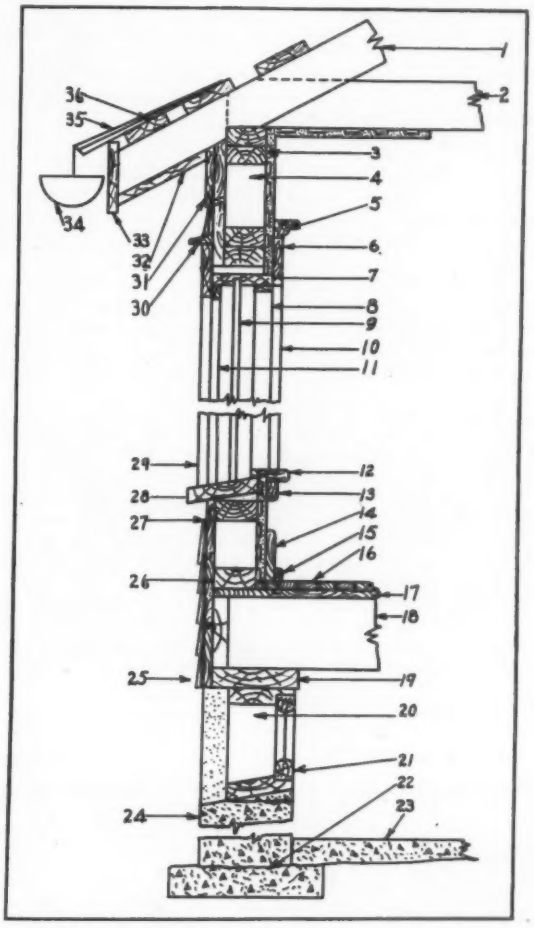
This completes the construction of the box, top, and lifter. The job should be finished in colored enamel, the designing of the decoration, or the lettering is left to the ingenuity of the boy who is making the project.

A FINAL EXAMINATION FOR BEGINNING HOUSE DRAWING

H. H. Robinson, Augusta, Kansas

Fill in each space so that the statement will be true and most meaningful.

1. ..... and ..... are good woods for house floors.
2. ..... and ..... are good woods for porch floors.
3. ..... and ..... are good woods for house siding.
4. ..... and ..... are good woods for shingles.
5. If a roof over a 24-ft. house rises to 8 ft., it has a pitch of .....
6. If a roof over a 30-ft. house rises to 105 in., it has a pitch of .....
7. A roof of ½ pitch over a house 20 ft. wide will rise ..... ft.
8. The best possible mixture of concrete is a ....., ..., ... mixture.
9. A 1, 3, 5, mixture of concrete contains one part ....., three parts ..... and 5 parts.....
10. If you wish to borrow money on a house, you must usually give a ..... on the house.
11. Hollow tile is a good insulating material because of the .....
12. ..... and ..... are excellent insulating materials.
13. A foundation may be waterproofed by coating it with .....
14. A drawing that contains all necessary dimensions and notes is called a ..... drawing.
15. Since concrete is not strong in tension it is ..... where it is subjected to pulling or tensile stresses.
16. The type of house-frame construction used here is called ..... framing.



WRITE OPPOSITE EACH NUMBER, THE NAME OF THE PART TO WHICH THE NUMBER HAS BEEN GIVEN.

17. ..... soil is most likely to cause a wet basement.
18. A 2 by 10-in. floor joist is ..... times stiffer than a 2 by 6-in. joist.
19. A 2 by 8-in. floor joist is ..... times stronger than a 2 by 6-in. joist.
20. The symbol for an outside door is ..... and the symbol for an inside door is .....
21. The symbol for a double-hung window is ..... and for a casement window is .....
22. The symbol for an electrical ceiling outlet is ..... and the symbol for a base outlet is .....
23. The symbol for a switch is ..... and the symbol for a telephone is .....
24. The owner of a house must bear the following items of expense that the renter does not have to bear: 1. ..... 2. ..... 3. ..... 4. ..... 5. ..... 6. .....
25. A line of motion is represented thus ..... and a hidden line thus .....
26. A cutting-plane line is represented thus ..... and a center line thus .....
27. The ..... heating system is the cheapest to install.
28. The ..... heating system takes the least fuel.
29. The ..... heating system takes up much room in the rooms heated.

30. The ..... heating system takes the most head room in the basement.

31. The following are two common sizes of flues, ... brick and ..... brick.

32. The ..... and ..... are two common bonds for laying bricks.

33. A 5-2 wood shingle is ..... of an inch thick at the butt.

34. A ..... roof slopes from four directions.

35. A house should be wired so as to provide outlets for the following electrical appliances: 1. ....., 2. ....., 3. ....., 4. ....., 5. ....., 6. .....

THE ENGINE STOPPED DEAD

Ray F. Kuns, Cincinnati, Ohio

"My engine stopped dead, and we had to push the car home. It was running fine right along, then suddenly it stopped."

Tickling the float in the carburetor showed that there was plenty of gas. Turning on the lights, gave evidence that there was nothing wrong with the "juice." Turning on the ignition switch made the ammeter flicker. Stepping on the starter turned the engine over nicely but the engine did not fire.

Next the head of the distributor was lifted off, and the breaker points were tested. The nice spark, which appeared when they were flipped apart, showed that the primary was all right. Then the rotor was given a turn. It turned around a ways and stopped. Then an assistant cranked the engine and it was seen that the rotor turned a little ways and then stopped. This showed where the trouble was. It was not an unusual one. The little gear *A* was worn out. This gear shown in Figure 1 drives the distributor shaft. It keeps the ignition or spark in time. When it fails, the shaft stops and the cam and rotor on its upper end stop with it. The points do not separate and even if they would, the high tension spark would not be distributed by the rotor to the proper cylinder.

In Figure 2, the gear at *A* is the one that failed. As is easily seen, the teeth on it were all ground off. The one at *B* was a replacement and shows how a new one appeared.

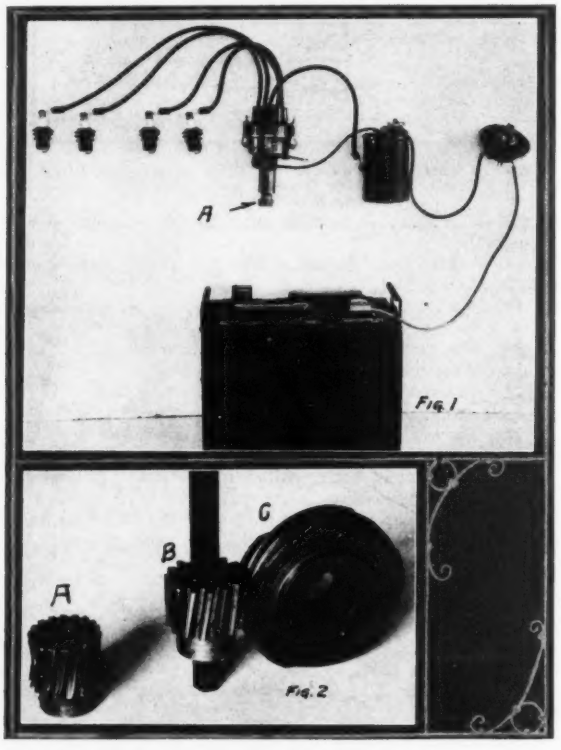


FIG. 1. The units of the ignition system.
FIG. 2. Mechanical failure frequently occurs at this point because no one lubricates the gears.

The gear *C* is the driving gear. The pencil in the shaft hole in the gear *B* gives an idea of the size of these gears. While they are small, they are of ample size if they are kept properly lubricated, but usually the oilcup which lubricates this part of the mechanism is hidden underneath the generator.

After the replacement gear had been put on, the cover plates were removed to expose the valve lifters. Again an attendant was required for turning over the engine by hand until the exhaust valve on cylinder No. 1 was closed and the intake was just starting to open. One full turn of the crank from that position was the end of the compression stroke for cylinder No. 1. After this turn had been given, the distributor had to be put in so that the breaker points were just ready to break with the spark control retarded and with the rotor resting under the sector to which was attached the wire that ran to the No. 1 plug.

The parts then had to be locked in position and the motor tested. To complete the job, the valve covers had to be replaced, the tools cleaned and returned to their proper places.

A DOUBLE-BARRELLED PROJECT

Fred J. Evans, Hamilton, Ont., Canada

Last spring, the woodworking department was asked to furnish a number of articles for the school bazaar. One class chose a bird house.

The problem was to produce as many houses as possible, without taking too much of the time from the regular course of study, and the boys solved it in the following manner:

One of them brought in several white-ash logs, about 6 in. in diameter, and 4 ft. long. These were first cut into blocks 11 in. long, then recut on the slant, making two pieces 6 in. long on one side, and 5 in. on the other.

The longer side was flattened for a width of 2 in. on the jointer, then the center was sawed out on the band saw, leaving about ¼ in. of wood under the bark. The end wood was then shellacked, and the pieces set away to dry, the center pieces being left in to retain the shape of the outer piece.

A back, bottom, and roof were prepared from ½ by 6-in. pine, each boy developing his own individual design for the sawed ends.

After these were stained either brown or green they were fastened to the log, the back with screws and the bottom and roof with nails.

An entrance was bored out through the center front, and ventilation holes bored at the top of each side under the eaves.

A crotch twig for an entrance perch completed this very interesting and worth-while project.

The centers laid around for awhile, until someone suggested that they would make good mallet heads. They were promptly turned over to the lathe shop, and a very good mallet was the result.

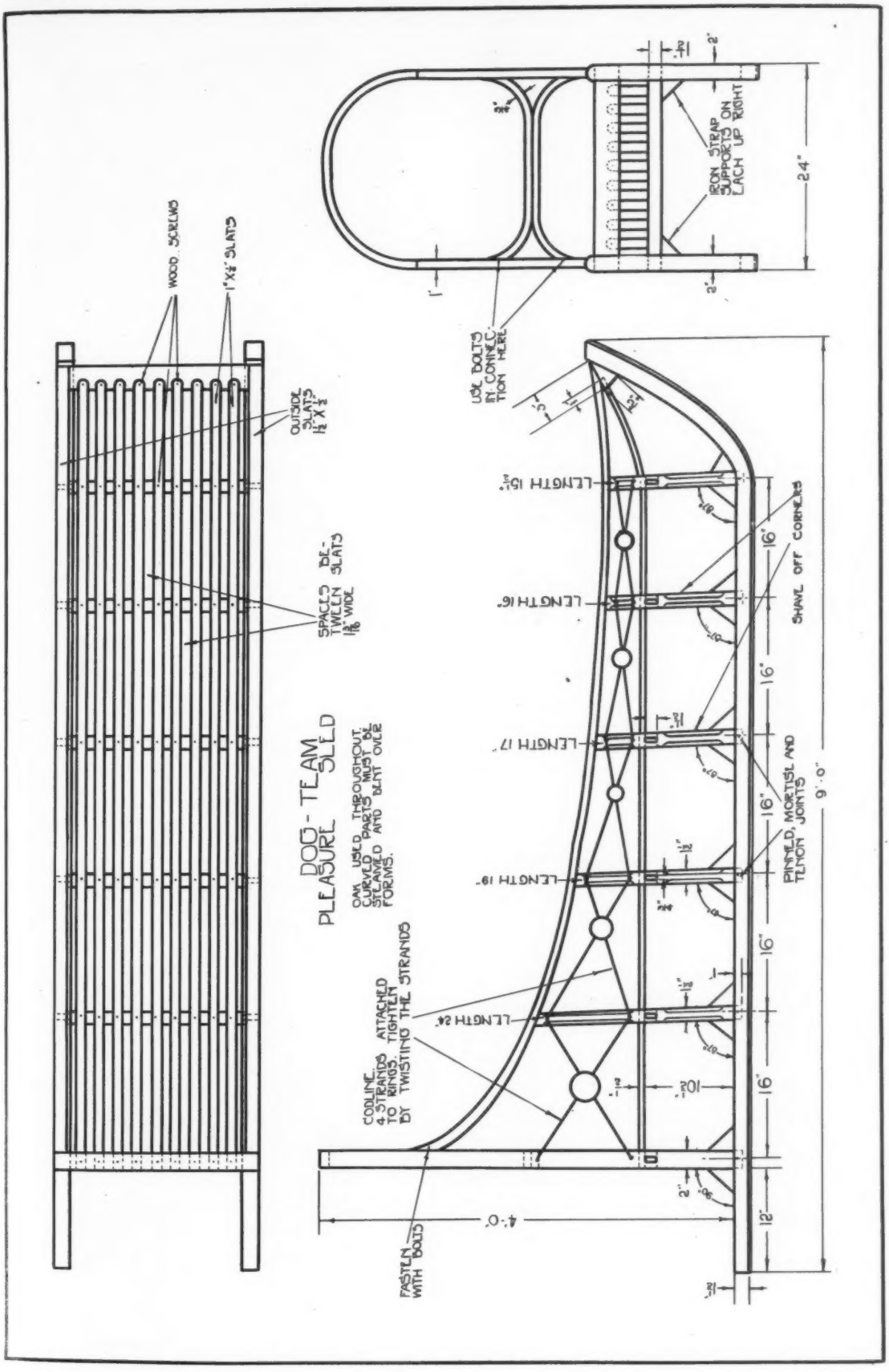
THE DOG SLED AS USED IN THE FAR NORTH

Roscoe Max, High School Senior, Sheldon Jackson School, Sitka, Alaska

The article on the dog sled presented herewith was sent to us by Mr. W. Leslie Yaw, Assistant Superintendent of the Sheldon Jackson School, Sitka, Alaska, in answer to a request for such information from one of the subscribers of the INDUSTRIAL-ARTS MAGAZINE.

The article itself was written by Roscoe Max, a full-blooded Eskimo boy from Point Barrow, who is now a high-school senior. The drawing for the cut was made by another Eskimo boy, also from Point Barrow. This last boy, Percy Ipalook, is a junior in the high school.

The dog sled which the Eskimoes use, has been improved in many ways just as have the automobile and other vehicles. There are several kinds of sleds for different purposes. The

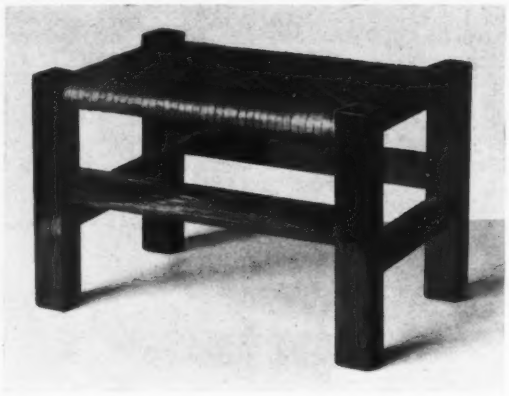


DOG TEAM PLEASURE SLED. DRAWING MADE BY PERCY IPALOOK, HIGH SCHOOL JUNIOR, SHELDON JACKSON SCHOOL, SITKA, ALASKA.

most popular type is the work sled which is made to carry heavy loads. Another type is the canoe sled. This sled carries canoes over the snow to desired launching places. There is also the pleasure sled, which is designed for pleasure purposes.

Most of the work sleds are 2½ ft. wide and 14 ft. long. Canoe sleds are 2½ ft. wide and 8 ft. long. Pleasure sleds vary in size. Most of them are 2 ft. wide and 10 ft. long. They are not heavily built, as they are made for light service.

A work sled requires from seven to fifteen dogs, according to the size of the load. A work sled when used for carrying mail takes at least fifteen to nineteen dogs. A canoe sled requires from seven to fifteen dogs and the help of six to twelve men. From three to seven dogs are used on the pleasure sleds. The number depends on the load and how fast the person wishes to travel.



CHILD'S CANED FOOTSTOOL

Paul N. Wenger, Supervisor of Manual Arts, Greenwich, Conn.

The child's caned footstool furnishes a relatively easy problem for the students. The project is small, thus the price of the material used in making it is within the means of the student. The stool furnishes a simple problem in caning for the beginning student. By assigning a small problem to the beginner, there is less danger that a dislike for the work is developed. In fact, the chances are that the student will want to construct a larger problem requiring the use of cane after he has finished this simple problem.

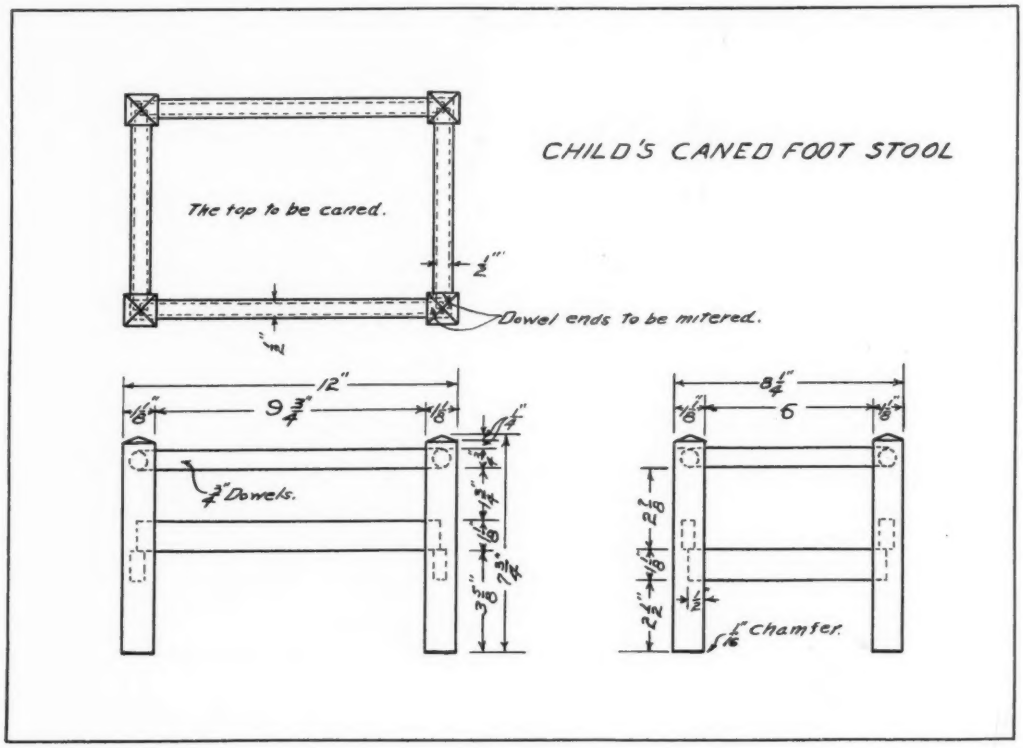
The ¾-in. dowels, upon which the caning is placed, may be made with the dowel cutter. This saves considerable time and effort as compared with turning them out on the lathe. Their ends should be mitered with the miter saw.

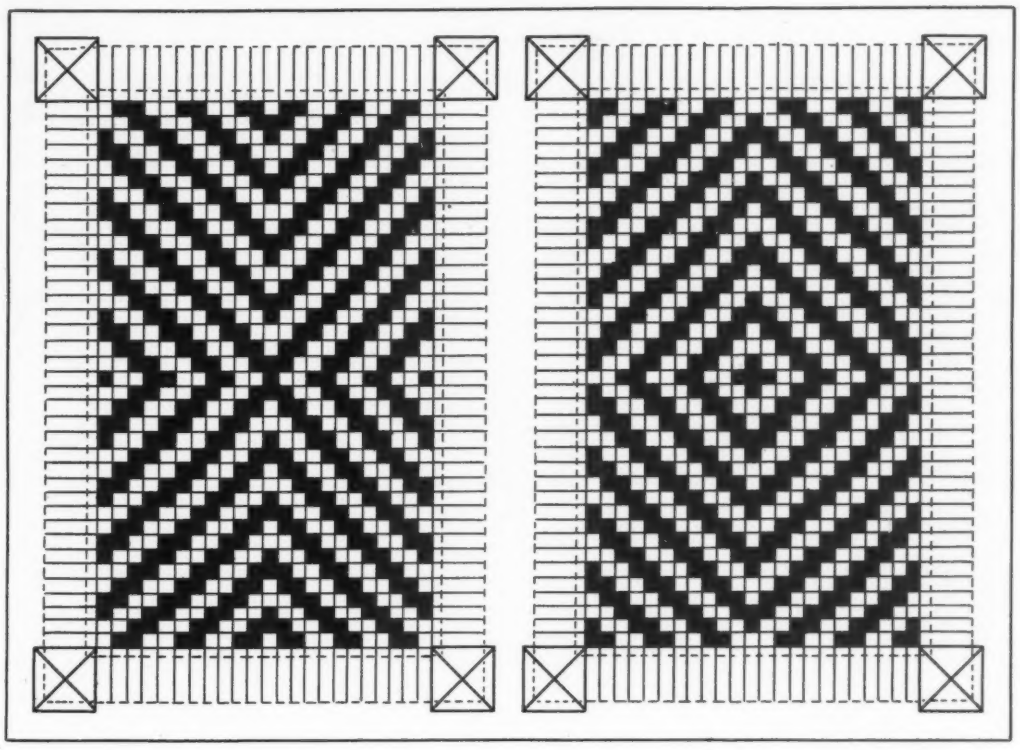
It is advisable to use ¼-in. flat fiber cane for this project. Due to the fact that the cane is slightly wider than ¼ in., the width and length of the stool is somewhat greater than would at first be supposed. If only ¼ in. is allowed for each strand, the caning becomes so tight that it is scarcely possible to complete the project. The sizes that are given for the stool are well suited for the proper number of strands that will form the given design.

The caning process of either design is rather simple. The most simple form, however, is the diagonal pattern shown. To form either of the given designs, it is necessary to use the same number of strands as is shown upon the design plate; 23 strands and 37 strands.

Stain sufficient cane so as to wrap the fiber lengthwise, forming 23 strands. Tack one end of the cane to the dowel and wrap lengthwise, being careful that no twists are allowed to remain in the strands. Fasten the other end of the cane to the dowel with a small tack. In caning the second step, which is crosswise, always be sure to begin in the center of the stool's length, and cane toward both ends, first one end and then the other end. The cane that is used crosswise is left a natural (white) color. The joints in the cane should always be made at the bottom of the seat, so as not to mar the finished appearance of the top. The crosswise, or natural-colored cane, is then woven up and down so as to form the given design. Care must be exercised to keep the strands straight and at their proper place.

The finished caned seat should be covered with several thin coats of shellac. This will aid in holding each individual strand in its proper place, as well as to keep the cane from becoming soiled. The other part of the stool may be given any desired finish. If, however, it is stained so as to harmonize with the colored cane, the appearance of the finished project is greatly increased.





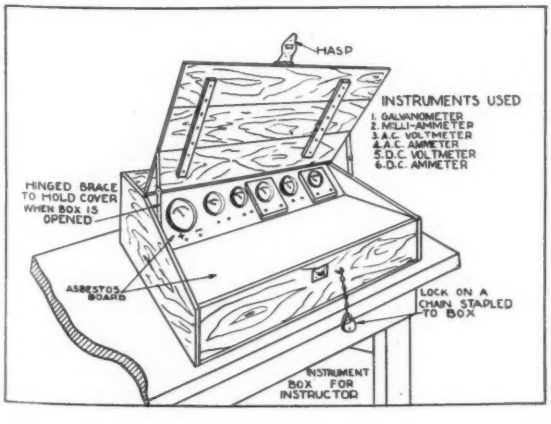
CANING PATTERNS FOR CHILD'S FOOTSTOOL. PAUL N. WENGER, GREENWICH, CONN.

AN INSTRUCTOR'S INSTRUMENT BENCH

Paul J. Rupprecht, Lindblom High School, Chicago, Ill.

Instructors, whose work calls for electrical testing and demonstrating, will appreciate this private instrument box because it saves them the embarrassment of explaining to the students "that the reading should be so and so, but because the instrument we are using is a little 'off' due to rough handling by former pupils, we cannot get anything closer." This means that the data collected to illustrate electrical laws must be "doctored" a trifle to obtain the correct conclusion. This act immediately lowers the pupils' estimate of their instructor and their respect for accuracy in testing.

The "radio cabinet" type of box shown with the hinged lid provided for locking, can be made as simple or as elaborate as time permits. The instrument panel and desk portions were made of ¼-in. asbestos (Transite) board laid on strips or rails. The space below can be utilized for placing a bell-ringing or toy transformer for low-voltage alternating currents, besides several dry cells hooked in series to provide a source of low-voltage direct current. A buzzer may be hooked in series with them for use in testing for "grounds" and "shorts." A convenience outlet or source of the house current supply should be nearby so that commercial objects such as motors, toasters, flat irons, etc., may be tested.



Test clips are needed for convenience and may be made up from flexible lamp cord using the alligator-jaw type of battery clip on one end with a wooden file handle into which has been driven a nail to be used as a prod, on the other end.

The galvanometer is handy for detecting very small currents such as are obtained by heating the juncture of two different wires to form a thermo-couple, or by placing a copper penny and a silver dime together with a little moistened salt between them.

The meters may be selected to suit the needs of a particular classroom, and should be of the panel mounting type, although we used several portable types by drilling holes through their bases so that they could be fastened down with machine screws.

The milliammeter is frequently used in checking radio and raytheon tubes for output. A tube checker is easily improvised in this way to ascertain when tubes are paralyzed and in need of a rejuvenation to drive the thorium from the center of the filament to the outside.

When closed, the top drops down to form a desk, which the instructor may use during his lecture or upon which a student may comfortably work. In this way classroom space will not be sacrificed by the addition of this piece of equipment.

A SPIRAL-TWIST FIREPLACE SET

Franklin H. Gottshall, Director Industrial Arts, Mount Berry School For Boys, Mount Berry, Ga.

Ten years ago any person who loved beautiful things made of iron could go into Pennsylvania or any of the New England states, and collect some of the very finest things made of this metal for little or nothing. It has been only within the past decade that antique collectors have begun to gather it to sell to the trade. Today it is in great demand, and artists are designing very beautiful and useful things that can be made of iron.

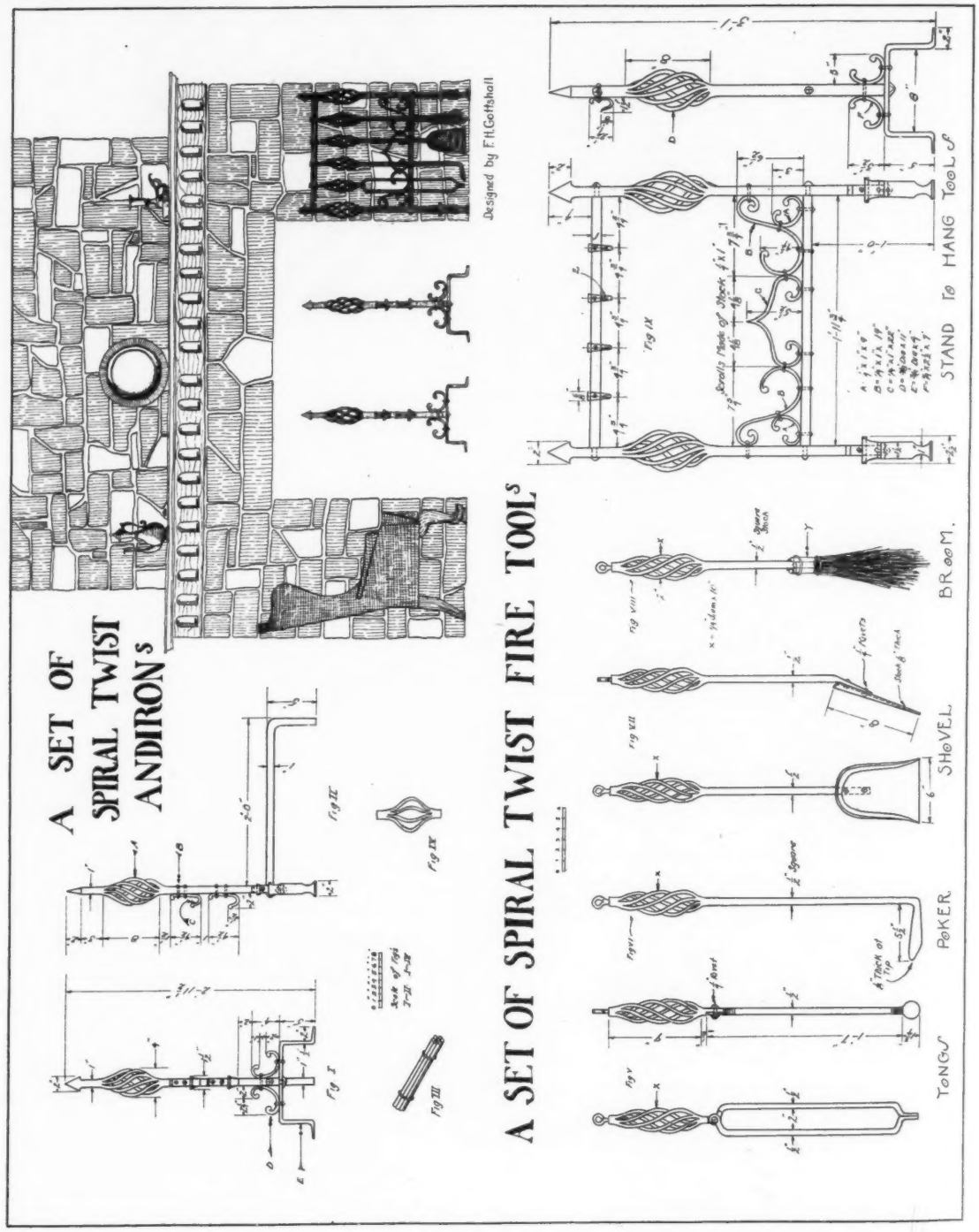
At the Berry School shops the design described herewith has not only been successfully made, but has also found much favor with the students.

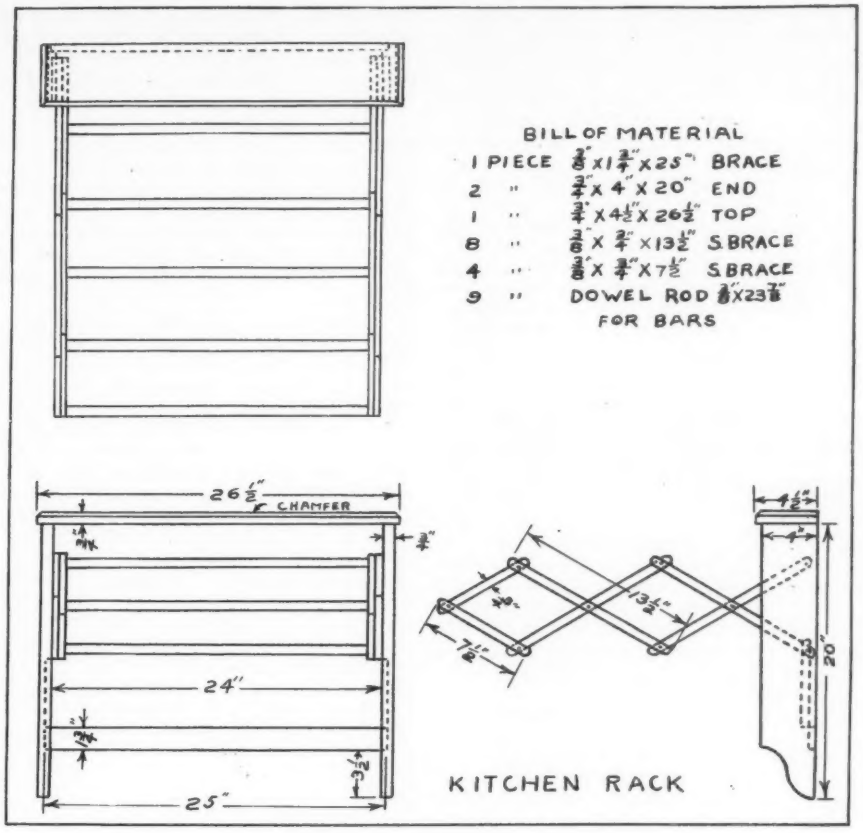
The spiral *A* on the andirons is made of stock ⅜ in. in diameter and 11 in. in length. Six of these should be tied

together, with wire into a bundle, as shown in Figure III, with a short piece about 1 in. long on each end making the center of the bundle. These rods must then be welded together at each end in a clean fire. A scarf is formed on the welded ends, making them ready to weld to the 1-in. square pieces forming the head of the spear and the stem of the andirons.

The spearhead is formed by upsetting the iron while hot before it is cut to length and should be thus handled, since performing this operation after the ⅜-in. wires have been welded to the head, may result in getting them out of shape, making it difficult to get a nice regular spiral. After beating the iron flat on two opposite sides, and then using a top and bottom fuller to form the shoulders under the head, there should be no difficulty in getting a good result.

After welding to the solid stock, the six wires should be equally separated one from the other, making the bulge about 5 in. across at the widest diameter as shown in Figure IV. This can best be accomplished by using a screw driver, or some other pointed instrument. This should be very carefully done, since the beauty of the result will depend largely upon how this part of the work is done. After heating the separated wires along their entire length to a good red color, fasten one end of the solid stock in a vise, and with a monkey wrench give the other end a half turn. The result will be a spiral about 4 in. in diameter.




BILL OF MATERIAL
1 PIECE 3/8 X 1 3/4 X 25" BRACE
2 " 3/4 X 4" X 20" END
1 " 3/4 X 4 1/2 X 26 1/2" TOP
8 " 3/8 X 3/4 X 13 1/2" S. BRACE
4 " 3/8 X 3/4 X 7 1/2" S. BRACE
9 " DOWEL ROD 3/8 X 23 7/8" FOR BARS
26 1/2" CHAMFER
24"
25"
KITCHEN RACK

DESIGNED BY R. B. FARR, EVERETT, WASH.

All rivets used in making both the andirons and fireplace set are ¼ in. in diameter. The stock used at *D* on the andirons is ¼ by 1½ by 11 in. This must be tapered to a width of 1 in. at one end so it will not be too wide where it fastens to the 1-in. square stock. The hooks at *C*, which are made of stock 7 in. long, are handled in the same way.

In order to fasten the legs to the 1-in. square body, a square shoulder must be formed about ¾ in. from the end of the latter. This end must be rounded to about ⅝ in. diam. After a hole is bored for this to pass through, it is riveted over on the other side.

The shovel can be made by cutting the stock to the desired shape and raising the edge on one corner of the anvil to the shape shown in Figure VII. The other details will present no great difficulty.

KITCHEN RACK

R. B. Farr, South Junior High School, Everett, Wash.

This handy little kitchen rack makes a very good junior-high-school problem, and when nicely stained or enameled makes a fine Christmas gift.

The rack has 16 ft. of drying space. When not in use it may be folded into a space 4 by 24 by 20 in.

The material best suited to use is hardwood. The dowels and braces should be stained and waxed. This enables them to move easier.

The other parts can be either finished the same or enameled in bright colors to match the kitchen color scheme.

Corner irons or screw eyes are used to hang the rack.

THE ASH TRAY

C. R. Townsend, O'Keefe Junior High School, Atlanta, Georgia

In mosts communities the shop teacher is asked, at some time or other, "Could you make this or that for the school or some organization in town?" The Junior Red Cross came to the author one day and wanted to know if the boys would make some ash trays for the World War Soldiers Hospital.

In consequence, the metal shop was turned into a small factory for a few days. Each boy was set to work at a different task, and they greatly enjoyed turning out the ash trays in mass production. These same ash trays can be used in every home where father or brother smokes. Besides this they can be made quite attractive with a little extra trouble.

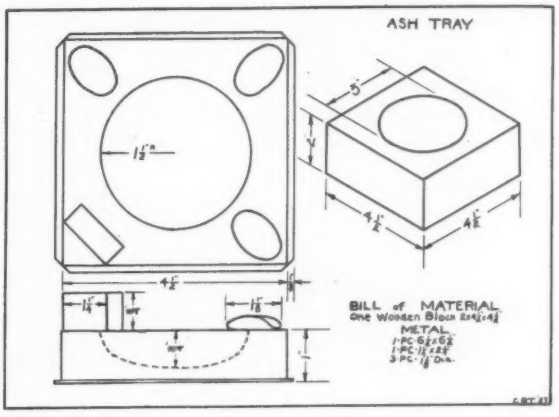
Method of Procedure.

1. First make a wooden block or form in which to shape the hollow for the ash tray. This block should be 2 by 4½ by 4½ in. and must be of hardwood. The hollow in the center should be turned out on a lathe, and should be 3 in. in diameter and ¾ in. deep.

2. Transfer the pattern of the tray to a piece of 28-gauge galvanized iron.

3. Cut out and fold into a pan shape.

4. Place the pan over the mold or form, and with the raising hammer pound and shape the hollow for the ashes.



5. Cut three discs of galvanized iron, 1⅛ in. in diameter for the cigar holders.

6. Punch a small hole in each circle for a rivet and shape half round to fit the cigar.

7. Rivet the discs to the tray as shown in the illustration.

8. Cut out a piece of galvanized iron ¼ by 2¼ in. for the match-box holder.

9. Shape as shown in the illustration. The box of matches will slip over this holder.

10. Solder the match holder in its proper place on the tray.

11. Turn the metal at the bottom of the tray at right angles to prevent scratching the surface of the table.

12. Solder the corners of the pan together on the inside.

13. Trim up all edges and round them off with a file.

14. Paint the ash tray any desired color.

THE A. V. A. CONVENTION

Another milestone in the history of vocational education has been passed, and the third annual convention of the American Vocational Association, to which those who are interested in vocational education had looked forward, is now a matter of history. This convention which was held on December 13, 14, and 15, 1928, at the Benjamin Franklin Hotel, Philadelphia, was attended by upward of 1800 members, who came from all parts of the United States, and a few from Canada.

The general meetings and sectional meetings were uniformly well attended. It was rather unfortunate that in several of the sessions, the speakers, for some reason or other, were unable to appear, and in a number of these cases, substitute speakers had to be put in. Occurrences of this kind, no doubt, are unavoidable in some cases, but those who are placed on the program should recognize that their nonappearance is unfair to those in charge of conducting a big undertaking such as the A. V. A. convention. Secondly, they are unfair to those who attend. It frequently happens that one attends a certain sectional meeting for no other reason than to hear the discussion of a given subject. In order to attend this meeting, an almost equally important subject in some other meeting must be sacrificed. It is disgusting then, after having made a choice of this kind, to find out that the speaker who was to discuss the given subject has not appeared. Usually it is too late to go to the other sectional meeting which may probably be held at a meeting place quite distant from where one is in attendance. Thirdly, it is unfair to the substitute speaker, who in order to be a good fellow, must appear before a large gathering without any preparation just to fill in a program which would otherwise be too short.

The scope and thoroughness of the discussions at the sectional meetings showed the appreciation and thought which executives, directors, supervisors, and teachers bring to the problems of industrial-arts and vocational education. Those who are engaged in general education in the elementary, secondary, and higher schools may well take an example from the earnestness with which the men who are entrusted with the industrial-arts and vocational education, study their problems.

Unfortunately one can be at but one place at a time. There were so many sectional meetings which were of interest, that it was difficult to decide which one to attend. There were, of course, the visits which had been planned for those who wanted to study the schools of the convention city, and then there were trips that had been projected to the various interesting industrial establishments of Philadelphia; furthermore there were opportunities for visits to places of historical value; and all of these were vying with the meetings of the agricultural sections, the rehabilitation section, the teacher-training section, apprenticeship conferences, foremanship improvement conferences, plumbing-education conferences, decorating instructors' conferences, printing education conferences, trade and industrial-education sections, home-economics section, part-time education section, industrial-arts section, commercial-education section, vocational-education section and bidding for a part of the visitor's time. No matter what choice one made, something equally good was being missed by nonattendance in several of the other sectional meetings held at the same time. But no matter which meeting one attended, there was always the assurance that one would meet there a goodly number of deeply interested persons.

Of special interest to the readers of the INDUSTRIAL-ARTS MAGAZINE, of course, were the meetings of the industrial-arts sections. Such subjects as, Significance to the Manual-Arts Program of Current Beliefs in Regard to Individual Differences; The Cost of Manual-Arts Instruction; The Function, Character, and Organization of Industrial-Arts Activities in the Elementary Schools; Objectives in Standards in Industrial Arts; The Development of Attitude and Outlook in Manual-Arts Teachers; The Function of the General Shop and Results of Experience in Its Organization and Conduct; How to Improve the Art Element in Manual-Arts Work; Common Errors in Technic and How to Correct Them; Use of Objective Tests by the Manual-Arts Teacher, show the wealth of material that appeared on the program, and such

MEMBERS OF NATIONAL ASSOCIATION OF STATE DIRECTORS OF VOCATIONAL EDUCATION MAKE TOUR OF PORT OF PHILADELPHIA. PHOTO SHOWS MEMBERS OF THE ASSOCIATION INSPECTING THE SCHOOLSHIP ANNAPOLIS.

speakers as F. M. Leavitt, C. A. Kunou, W. R. Ward, A. C. Tagg, H. J. Van Westrienen, W. T. Bawden, A. B. Mays, E. L. Bedell, R. W. Selvidge, W. L. Hunter, and W. C. Ash are a guarantee that these subjects were handled in masterly fashion.

Taken all in all, the third annual convention of the American Vocational Association advances the goal which past conventions had set, and which future conventions must strive to surpass.

Other sectional meetings of equal interest to some of our readers were those held by the printing education group, and again both subjects and speakers bespeak the thoughtfulness and care with which the program makers took care of their work. Among the subjects might be mentioned the following: Why Printing is Taught in the Schools of Chicago; Printing Production vs. Instruction in the Junior High School; The Relation of the Fine Arts, English, Design, etc., to Printing; Objectives in Printing Instruction in the Junior High School, the Senior High School, the Full-Time and Part-Time Vocational School; Short Addresses by Editors of Trade Journals in the Printing Field; Professionalism in Teaching Printing; Craftsmanship in Printing; show how broadly the subject was viewed by those in charge of the program.

Speakers such as W. J. Bogan, R. E. Throssell, L. H. Dennis, E. E. Sheldon, Mary T. McGuire, M. W. Haynes, J. C. Frazier, W. L. McCain, E. G. Gress, Charles McIntyre, David Gustafson, and R. P. Gallagher show the type of men who were chosen to handle these subjects.

Similar lists of subjects followed by similar lists of speakers who most ably covered their subjects, might be listed for the part-time education section, the vocational-guidance section, the decorating instructors' conference, the plumbing-education conference, apprenticeship conference, foremanship improvement conference, rehabilitation section, and the teacher-training section.

Of equal interest were those two sessions in which the somber schoolmen had an opportunity to relax their usual professional dignity and to slip back into the roll of just ordinary humans. The annual banquet on Friday evening which was followed by a dance, was attended and enjoyed by hundreds. Equally entertaining was the general session held Friday afternoon at which "The Ship," an organization made up of the commercial exhibitors, gave an entertainment and awarded the prizes that had been donated by the various exhibitors.

It goes without saying that addresses given by such men as R. L. Cooley, President of the American Vocational Association; C. A. Prosser, Director of Dunwoody Institute, Minneapolis; J. C. Wright, Director, Federal Board for Vocational Education, Washington, D. C.; David Snedden, Professor of Education, Teachers College, Columbia University; Frank Cushman, Chief of Training and Vocational Education Service, Washington; Charles R. Allen, Federal Board for Vocational Education; C. W. Sylvester, Director of Vocational Education, Baltimore, Md.; G. D. Whitney, Director of Department of Vocational Education, University of Pittsburgh; E. A. Lee, Director of Division of Vocational Education, University of California, Berkeley; and F. J. Keller, President of Eastside Continuation School, New York City, did much to place the deliberations of the convention on a high professional level.

At the business session, the following men were elected to office in the American Vocational Association for the coming year: President, R. L. Cooley, Milwaukee, Wis.; Treasurer, Charles W. Sylvester, Baltimore, Md.; Representative for Trade and Industrial Education, W. A. O'Leary, Trenton, N. J.; Representative for Rehabilitation, H. L. Stanton, Raleigh, N. C.

THE MANUAL-ARTS CONFERENCE AT ST. LOUIS

The nineteenth manual-arts conference held on December 6, 7, and 8, 1928, at the Maryland Hotel, St. Louis, Mo., was attended by 34 representatives who came from 14 different states.

The membership of this organization is limited to a total of 75 persons interested in the training of teachers and supervisors of industrial arts and vocational education.

There were 7 sessions held in which the problems of the junior- and senior-high-school shop were thoroughly discussed. Among the topics were the following:

Problems in shop planning, The Place of Manual Arts in the Senior High School; Manual-Arts Standards for the Junior High School; Analysis of the General-Shop Plan of Organization; Manual Activities in the Elementary School; Reorganization of Methods for the Larger Cities; and The Methods and Devices for Handling Tools and Supplies.

All of the sessions were well attended. The businesslike way in which the meetings were conducted might well serve as a model to those who have the responsibility of conducting other educational conventions. Each session was started promptly at the appointed time. Each speaker was required to furnish a multigraphed or mimeographed outline of his talk to those who were present. The main speakers, as well as those who arose to discuss any of the topics, were held strictly to a time limit. This made for orderly procedure, strict adherence to the subject under discussion, and gave those who attended a feeling of worth whileness which is so often lacking in meetings held by other educational organizations. Great credit for this businesslike method of doing things, no doubt, is due to the able management of Dr. Wm. T. Bawden, who has been general chairman of this organization practically from its inception.

The discussions showed that the emphasis of the industrial arts in the elementary school should be given to opportunities for expression, in the junior high school for investigation, and for the senior high school for specialization.

At the business session, it was decided to hold the next meeting of the conference at Peoria, Ill.

VOCATIONAL EDUCATION AND PRACTICAL ARTS AT THE PENNSYLVANIA STATE EDUCATION ASSOCIATION MEETING IN READING

Vocational education and practical arts were given a prominent place on the program of the Pennsylvania State Education Association, held on December 27 and 28 at Reading, Pa. A large attendance marked the general meeting and the four sectional meetings in agriculture, continuation schools, home economics, and industrial-arts education.

Mr. Paul W. Chapman, state director of vocational education of Athens, Ga., and Miss Helen C. Goodspeed, assistant to the director of home economics in Philadelphia, gave talks at the vocational session. Dr. G. D. Whitney, director of vocational education at the University of Pittsburgh, led the discussions which followed the talks.

At the sectional meetings, supervisors, teachers, and representatives of the Pennsylvania education department participated. Among these were Mr. H. C. Fetterolf of Harrisburg, Mr. A. M. Goldberger of Pittsburgh, Dr. F. T. Struck of State College, Mrs. Anna G. Green of Harrisburg, and Mr. G. U. Cleeton of Pittsburgh.

Speaking on the topic, "The Present Situation in Agriculture and Industry in Relation to the Vocational Program of the Future," Mr. Paul W. Chapman of Athens, Ga., declared that there would be little regret in the fact that many students fail to complete high school, provided a proper amount of free education was readily available later in life. Mr. Chapman criticized the system which has been established in this country, offering a high-school education to every citizen, and pointed out that few of the people avail themselves of the privilege of obtaining all of their entire allotment. Inasmuch as part-time education and evening-school classes meet the demands of adults, he advocated similar schools for training in agriculture and industry as well. Mr. Chapman held that considerable progress has been made in the development of part-time and evening classes, but pointed out that there are great possibilities along these lines for the future.

Miss Helen Goodspeed in her talk on "Stressing New Values in Home Economics," showed the need for cooperative homemaking in which the men and women help each other. She pointed out that home economics is now taking on the workable plan of home building by carpentry classes, and predicted that the next step will be the formation of classes for boys. She mentioned places in Pennsylvania and elsewhere which have successfully conducted such classes.

Mr. G. U. Cleeton of the Carnegie Institute of Technology, Pittsburgh, who talked on "Will Educational Philosophy of the Future Follow the Lead of Industrial and Vo-

cational Education," was the first of three speakers. Professor Cleeton does not believe the educational philosophy of the future is liable to be influenced by industrial arts, but he declines to state whether it will be influenced by strictly vocational education. He believes that the present need in industrial-arts education is to redetermine the ends and aims of industrial arts.

Mr. William A. DeVette, of Erie, Pa., gave an illustrated talk on "The Vocational Instructor and His Blackboard." Mr. DeVette advocated extended use of the blackboard by instructors and demonstrated how teachers may easily adjust themselves to working at the board.

"New Projects and Machines for School Shops" was the subject of Mr. S. L. Coover's talk. He presented several new projects and described how he had developed inexpensive machines with which to produce them in his school shop. He outlined eight points necessary in a good junior high school project. Mr. Charles F. Bauder, of Philadelphia, Pa., led the discussion following the talks.

At the business session, the officers elected for the year 1929 were as follows: President, Mr. H. G. Parkinson, State College; vice-president, Miss Martha Goulden, Wilkes-Barre; secretary, Mr. S. L. Martini, New Castle.

New Castle was selected as the meeting place for the 1929 convention.—*T. A. Siedle.*

THE VOCATIONAL MEETINGS AT WASHINGTON, PA.

A number of meetings were held during the week of December 17 by the Washington County Vocational Society of Washington, Pa.

Mr. M. H. Stuart, of the Arsenal Technical High School, Indianapolis, Ind., gave a talk on the subject, "Some Problems and Their Solution," pointing to the motley group of students in the schools and to the variety of talent displayed by the several students, including those with abstract minds, those with concrete minds, those with the social type, and those who belong to the political and promotors' groups. He mentioned the project type of mind which is administered too largely through the industrial-arts program.

Prof. Russell Greenly, of the Municipal University at Akron, Ohio, spent a day at the institute, and gave an excellent talk on the topic, "Pseudo Jobs and Pseudo Men." Professor Greenly demonstrated a number of ways for preventing misfits and urged that the industrial-arts course be constructed in such a way that it means something to the boy when he takes up trade-school work. The course must be a guiding agency through which the right boy is selected for the right place. Mechanical drawing and other courses, he said, are now on a par with the academic courses in many colleges and universities, and many educators believe that the best way to teach geometry is through the medium of mechanical drawing.

THE MARYLAND VOCATIONAL EDUCATION ASSOCIATION

The sixth annual meeting of the Maryland Vocational Education Association was held November 30-December 1, at the Baltimore City College in Baltimore, in connection with the 61st annual convention of the state teachers' association. Approximately 200 persons attended the general and sectional meetings.

The members attended the general session of the State Teachers' Association on November 30 where they listened to an address by Dr. David Snedden of Teachers College, Columbia University, on the subject, "Progress Toward a Science in Education."

The annual banquet of the association was held in the school cafeteria, with Mr. H. F. Cotterman, president of the association, acting as toastmaster.

Dr. Snedden gave an interesting talk on "Progress in Vocational Education," at this banquet. Brief talks were also made by Dr. W. S. Small, of the University of Maryland; Mr. J. D. Blackwell, state director of vocational education; and Mr. C. W. Sylvester, director of the division of vocational education in Baltimore. More than 100 attended.

The association voted to hold the next banquet meeting in February, when it is possible to have a larger attendance. The regular business meeting will be held as usual at the time of the state teachers' meeting. The association showed their interest in the legislative work of the American Vocational Association by a contribution of $42.50 for their use.

A number of sectional meetings were held for the discussion of problems in agricultural education, industrial education, commercial education, home-economics education, and vocational guidance.

At the business session, the association elected the following officers for the year:

President, Mr. Riley S. Williamson, assistant supervisor of industrial education, Baltimore; vice-president, Miss Mildred A. Bowers, principal of the Girls' Vocational School, Baltimore; secretary-treasurer, Miss Elizabeth Emery, state supervisor of home-economics education, Baltimore.—*Charles W. Sylvester.*

ELECTED PRESIDENT OF THE MARYLAND STATE TEACHERS' ASSOCIATION

At the annual convention of the Maryland State Teachers' Association, Charles W. Sylvester, Director of Vocational Education, Baltimore, was elected president.

CHARLES W. SYLVESTER
President of the Maryland State Teachers' Association.

This is a deserving recognition of the creditable work which Mr. Sylvester has done in furthering vocational education in Maryland.

ANNUAL MEETING OF THE IOWA ASSOCIATION OF INDUSTRIAL AND MANUAL-ARTS TEACHERS

The annual meeting of the Iowa Association of Industrial and Manual-Arts Teachers was held November 8 and 9 at Des Moines. The Thursday session was opened by Pres. Fred J. Schmidt of Boxholm. He was followed by Mr. W. L. Hunter of the Iowa State College, who talked on the subject, "Manual Arts in the Junior High School." Mr. R. C. Woolman of Des Moines led the discussion which followed the reading of the paper. The second topic was a discussion of the committee's report on the course of study, which was presented by the chairman, Mr. A. P. Twogood of Newton. This committee is to continue its work as an advisory committee to the state superintendent in the work of preparing the state course of study for junior and senior high schools of the state.

On Friday morning, the entire group of teachers was taken to the Ford plant, where they were conducted on a tour of the various departments. Later the group met in the Chamber of Commerce dining room at the Hotel Savery for the annual luncheon. Prof. Charles Bailey, of the State Teachers' College, Cedar Falls, acted as toastmaster, and Dr. P. P. Claxton, superintendent of schools of Tulsa, Okla., gave an address on the subject, "History and Development of Manual Arts."

Following the luncheon, the teachers united with the Iowa Vocational Guidance Association in the Chamber of Commerce library. Dr. A. E. Winship of Boston, the first speaker, gave a talk on the topic, "Learn to Do by Doing." Dr. Winship was followed by Prof. Morgan of the Iowa State

College, who gave a talk on the subject, "Vocational Guidance."

The officers elected for the year are as follows:

President, Mr. H. W. Carmichael, Des Moines; vice-president, Mr. R. R. Ebersold, Cedar Falls; secretary, Mr. LeRoy Jones, Des Moines; treasurer, Mr. Charles N. Easton, Des Moines. Mr. William C. Wood of Davenport, was elected to fill a vacancy on the board of trustees.—*H. W. Carmichael.*

DEPARTMENT OF VOCATIONAL EDUCATION WILL MEET IN CLEVELAND

The Department of Vocational Education of the N. E. A. will meet February 24 to 28 at Cleveland, Ohio. The program is not yet complete, but the officers have made progress in the working out of the program.

On Monday, February 25, there will be an agricultural section.

On Tuesday, February 26, there will be a meeting at which selected vocational institutions are explained by their directors.

On Tuesday, February 26, will occur the general educational program for representatives of the three fields of agriculture, home economics, and industrial education.

On Wednesday, February 27, will occur a meeting at which selected manual-arts programs will be discussed by the respective supervisors.

Programs in the field of home-economics education will be presented under the auspices of the American Home Economics Association, and commercial work will be represented by programs given by the department of business education.

The officers of the department have planned programs of special interest and help to teachers and administrators of the general group. The sessions are intended to afford opportunity for becoming acquainted with the special purposes and plans.

THE MEETING OF THE SOUTHERN ILLINOIS MANUAL-ARTS GROUP

The manual-arts discussion group of Southern Illinois held its third meeting on Saturday, December 8, at Belleville. A total of sixteen men were in attendance, representing twelve schools from that part of the state.

Mr. L. D. Atkins of Centralia, was in charge of the morning session in the absence of the regular chairman, Mr. Floyd Smith. Mr. A. A. Bohannon, of Belleville, opened the session, with a talk on "The Principal Characteristics of a Metal Course in the High School." Mr. C. Winston of West Frankfort, who followed, talked on "The Contents of a Home-Mechanics Course for High-School Freshmen."

Preceding the luncheon hour, the group visited the local school instructors in their shop, which brought the men into direct contact in the matter of common problems.

The afternoon session was in charge of Mr. G. Henry Schroeder, of Carbondale. The topic for discussion was "The Amount of Time to be Devoted to Mechanical Drawing and How it Should be Taught." Mr. Erwin Touve, of Marion, in outlining the subject, defended it against a barrage of questions. Mr. Touve's experience in this subject made him well-informed on the topic and his solution of the problems presented were very satisfactory.

A short business session was held, during which plans were outlined for the next meeting. Upon the suggestion of Mr. L. C. Petersen of Carbondale, two special committees were appointed, to make a study of the subjects most beneficial to students who finish high school and those who leave, and to study the subjects which might be of help to the students. Mr. C. Winston Luce, of West Frankfort, was assigned to the task of checking up equipment already in use in the school shops and to learn which are considered of most importance.

The next meeting of the group will be held on Saturday, March 23, at Carbondale.—*H. D. Fortney.*

MISSOURI VOCATIONAL ASSOCIATION ELECTS OFFICERS

The Missouri Vocational Association, at its meeting at the Lathrop Trade School, Kansas City, elected the following officers:

President, Mr. G. W. Reavis, Jefferson City; secretary, Mr. C. L. Wetzel, Jefferson City. The five vice-presidents are Mr. F. E. Gillett, Fredericktown; Mr. L. G. Dake, St. Louis; Mr. C. V. Hill, Kansas City; Miss Mildred Tandy, Lexington; and Mr. E. A. Hidey, St. Louis.

THE OKLAHOMA CITY MEETINGS

The second regular monthly meeting of the Oklahoma City Industrial-Arts Club, held in November at the Central High School, was in charge of Mr. H. F. Rusch, director of industrial and vocational education. Mr. McKimmey, of the woodworking department of the school, gave an interesting talk on shop organization.

An invitation was extended to the special-room teachers of the intermediate grades to attend the meetings of the club.

The third monthly meeting, which was held on December 5, took up the topic of "The Use of Tests and Measurements," and was presented by Mr. Colley of the Capitol Hill Junior High School.

The report of the committee on accident insurance for industrial-arts teachers was read at that time. Mr. Claude Keenan, of the Roosevelt Junior High School, presented a report of the meeting held at the new industrial-arts building of the A. and M. College, at Stillwater, on November 24.

Mr. Arnold of the Capitol Hill School gave a short talk on his impressions of a summer's work at Stout Institute.

THE PLUMBING CONFERENCE AT COLLEGE STATION, TEXAS

A plumbing instructors' conference was held November 12 to 24, at the A. and M. College, College Station, Texas, under the auspices of the industrial-education department of

(Continued on Page 30a)

PICTURE TAKEN AT THE FORMAL OPENING OF THE NEW $150,000 INDUSTRIAL BUILDING, A. & M. COLLEGE, STILLWATER, OKLA., NOV. 23 AND 24, 1928. PROF. DeWITT HUNT IS THE HEAD OF THE INDUSTRIAL-ARTS DEPARTMENT.

NOW, ARE THERE ANY QUESTIONS?

Finishing Wrought Iron

855. Q.: We are doing considerable hand wrought-iron or metal work which is progressing nicely. However, I am lacking experience and information as to the various finishes; that is, how to produce the brown rusty effect; the black; the half polished, etc.—*H. C. D.*

A.: After forging the iron to the desired form, and after assembling the different pieces, clean it thoroughly with No. 3 steel wool; 4/0 garnet sandpaper; or FFF pumice flour and rubbing felt augmented with a stiff bristle brush. This should be continued until the metal is bright. In case a buffing wheel is available, it should be replaced with a fine wire wheel capable of giving a fine brush effect.

Following the polish work, the metal should be cleaned in a 10 per cent sulphuric acid bath, or pickle, as it is known in the trade, during which process the last traces of grease of other foreign material will be removed. This should be followed by an immediate rinse in clean boiling water to remove all traces of acid, and drying under heat without handling with the hands. The fingers will always carry grease or traces of acid, and this invariably develops rust spots, hence the pieces should be wired with annealed wire to provide for easy handling during the five-minute pickling operation. After the pieces are dry, they should be handled with dry, cheap, cotton working gloves, until they are protected with the final finish coat.

For half-polished effects, where the iron has been tooled and peened, it will be sufficient if black brushing lacquer is carelessly applied and wiped off on all high spots with a rag dampened but not saturated with lacquer thinner. In this connection it is suggested that effects be worked out ahead of time on metal panels which are at least 6 by 8 in. Antique copper and verde copper methods have been previously described in other issues for metal book ends. Different results can be had with copper plating the iron, sanding or buffing through the plate to expose the iron, this to be followed by treatment with potassium sulphide or ammonium sulphide solutions, and with a final coat of clear metal lacquer preferably applied with a spray outfit. Dipping may be satisfactory in the case of small articles, but these should be withdrawn from the dip at such a very slow rate that sags and curtain are successfully avoided.—*Ralph G. Waring.*

Refinishing Walnut

856. Q.: The interior of a walnut magazine rack was not sanded very smooth and when it was waxed, it turned white in the low places. What can I do for it?—*D. F. M.*

A.: The interior of the walnut magazine rack should be washed in gasoline and allowed to dry. All parts should then be sanded with a split 6/0 paper, dusted off and given a thin coat of orange shellac made from one part of four-pound stock and three volumes of denatured alcohol. When dry, sand with 6/0 split paper and after dusting, apply a coat of dark brown wax made by adding some dry burnt umber to the light wax. Let harden and then bring up to a polish with a brush and rags.—*Ralph G. Waring.*

Cloudy Filler

857. Q.: How do you prevent dark filler from making oak cloudy or muddy looking?—*D. F. M.*

A.: Dark filler may cause the wood to look cloudy for a number of reasons. First, the wood should be properly sanded, "with the grain," until glass smooth, and free from all tool marks or scratches; at least 00 paper, or finer, should be used.

Next, the filler itself may not be correctly compounded. It should be made on a silex base, rather than starch; should contain enough oil, varnish, dryers, turpentine, and gasoline to insure proper working and hardening. It should be allowed 48 hours to dry in a warm room.

Last, your clean-up practice may be at fault. Filler should be brushed on with the grain, and after being allowed to lose its initial gloss, should be rubbed in across the grain, using a cloth folded to form a pad, but one face of which is used to do the work. In this manner much excess filler base is forced into the pores and thereby leveled up. Finally, use clean rags to remove any cloudiness left from previous operations. Do not attempt to cover too much surface at one time while brushing on filler, or it will get so hard that it will be very difficult to remove. Use a hardwood picking stick to remove any material jammed into joints or corners.—*Ralph G. Waring.*

Removing Wax

858. Q.: I wish to varnish a surface that has been waxed. What is the best way to remove the wax?—*D. F. M.*

A.: To remove the wax, wash the surface thoroughly with a mixture of one part turpentine and two of gasoline, using plenty of the mixture and clean rags. Let dry, then wash with a sponge, warm water and Lava soap, this in order to remove any possible traces of greasiness. If the table has been shellacked, let it dry thoroughly after washing, sand lightly with a split 6/0 paper, dust off, and give a very thin coat of shellac reduced with four parts of denatured alcohol. Allow to dry hard, and sand with used split 6/0 paper just enough to guarantee an absolutely smooth surface well sealed. If the table is open pored then the wood should be filled as noted above; dried 48 hours; dusted off, and then given its first coat of varnish which should preferably be of the highest grade floor varnish and not spar as is so often mistakenly recommended.—*Ralph G. Waring.*

Fireplace for Gas

859. Q.: I should like to build my own fireplace for gas. Do you know where I could get a plan for one? Do you think it would be practical to make some secret doors in it and use it for a writing desk or letter file? Whom could I get to help me with a design? Art Moderne might be suitable.—*D. F. M.*

A.: In regard to the fireplace suggestion I would frankly veto the whole proposition. In the first place it is no job for an amateur to attempt. The matter of fireproofing the surrounding walls of the fireplace; the question of ventilating to absolutely preclude the possibility of having the carbon monoxide contaminate the air in the room and probably causing poisoning and death; the matter of insulating the fireplace in such a thorough manner that your "secret doors and writing desk, or letter file," do not catch fire; and to insure that the writer does not catch fire while at the desk; all these questions make it important enough to make it a problem for a competent architect or engineer, rather than for an amateur.

Finally, forget any ideas you may have regarding the so-called "Art Moderne," since none of the pieces offered in the stores are being sold in spite of a very strenuous effort to foist them on the public. They have all been had "on consignment" from the manufacturer and are being rapidly returned to him since in neither Canada or the United States is there any sale for this class of furniture. The indications are at this time that it will not even be shown at the next furniture exposition, either at The Furniture Mart in Chicago, The Jamestown Show, or The Grand Rapids Show. If you want good ideas for designs consider the better examples of Americana as typified by the so-called Colonial.—*Ralph G. Waring.*

NEW PUBLICATIONS

The Training and Experience of 480 Industrial-Arts Teachers

By Fred Strickler. Paper, 115 pages, 6 by 9, illustrated. Price, $1. Published by Bureau of Publications, Teachers College, Columbia University, New York City.

This study made by the questionary method, covers the returns from 480 teachers who were teaching in 37 states. It was made for the purpose of determining what training and experience industrial-arts teachers possessed so that teacher trainers would have some foundation upon which to base the

(Continued on Page 28a

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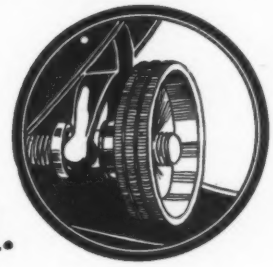

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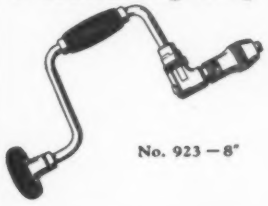

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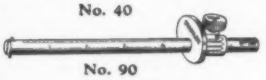

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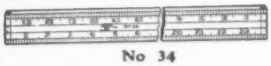

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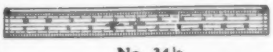

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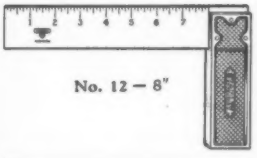

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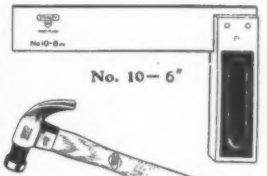

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(Continued from Page 86)

further reconstruction of their courses.

A number of tables and graphs complete this very interesting study.

Printshop Practice

By R. A. Loomis. Cloth, 106 pages, 6 by 9, illustrated. Price, $1.20. Published by The Bruce Publishing Company, Milwaukee, Wis.

The author of this book has seemingly succeeded in embodying in it only those things which the beginner needs to know in order to be able to produce a simple printing job.

His explanatory matter is concisely stated, and good illustrations assist the student in visualizing the directions that are given him.

The questions at the end of each chapter assist the student in testing his knowledge and also in organizing the subject matter in his mind.

The appendix contains 45 typical printers' problems.

The teacher of printing will find this text brief and to the point. It is just what the beginner needs. Its explanations clarify, they are neither too long nor too short. The average number of pages to a chapter is 7, hence each chapter is short enough to be looked upon as a unit of instruction.

Instruction Sheets for Burghardt's Machine Tool Operation—Part I and II

By Henry D. Burghardt. Each part consists of 27 sheets, 4¾ by 7½, in an envelope. Price, 50 cents per envelope, or Parts I and II, bound together in book form, $1.00. Published by McGraw Hill Book Company, New York City.

These instruction sheets should be quite helpful to the teacher who uses Burghardt's texts on Machine Tool Operation in his machine shop. All references in the instruction sheets refer to pages in one or the other of Burghardt's two textbooks.

Part I of the instruction sheets contains 4 lessons on small tools, 21 on the lathe, and 2 on the forge.

Part II contains 5 lessons on the drill press, 6 on the shaper, 3 on the planer, 11 on the milling machine, and 2 on the grinding machine.

The directions contained in these sheets are concise and specific and should greatly simplify the work of the teacher in the shop.

Preparatory Electricity

By Beverly B. Burling, S.B., E.E. Paper, 116 pages, 8¼ by 10¾, illustrated. Price, 76 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

This loose-leaf shop manual presents 28 job sheets for the study of elementary electricity. The author has succeeded in embodying a rather comprehensive preparatory electrical course in a comparatively small number of instructional units.

The lessons are well illustrated. They consist of a statement of the job, a general explanation, an outlined method of procedure, some related information and a series of questions based on the work which the student has just finished.

The jobs are of sufficient variety to cover a wide field of application, as well as to hold the students' interest.

These lessons will be found to be a great help to the science teacher, the teacher of electricity in full-time and part-time vocational schools, and the teacher in the general shop who wants some lessons on the fundamentals of electricity.

Practical Wood Carving—Part I

By Eleanor Rowe. Flexible cloth, 93 pages, 5½ by 8½, illustrated. Price, $1.25. Published by The Bruce Publishing Company, Milwaukee, Wis.

This book is introductory to the general subject of carving. It commences with definite directions for choosing the tools and equipment used by the carver. A discussion of the various woods used for the work follows. Then there are well-illustrated directions for the different types of low and high relief work.

This little volume, at its reasonable price, is a valuable vade mecum to the beginner in wood carving.

A Booklet of Instruction for Model Airplane Building. Under the title of "A Manual for Model Plane Builders," the American Boy Magazine has issued a booklet of instructions for model airplane builders. The booklet which has been prepared by Mr. Merrill Hamburg, secretary of the

(Continued on Page 30a)

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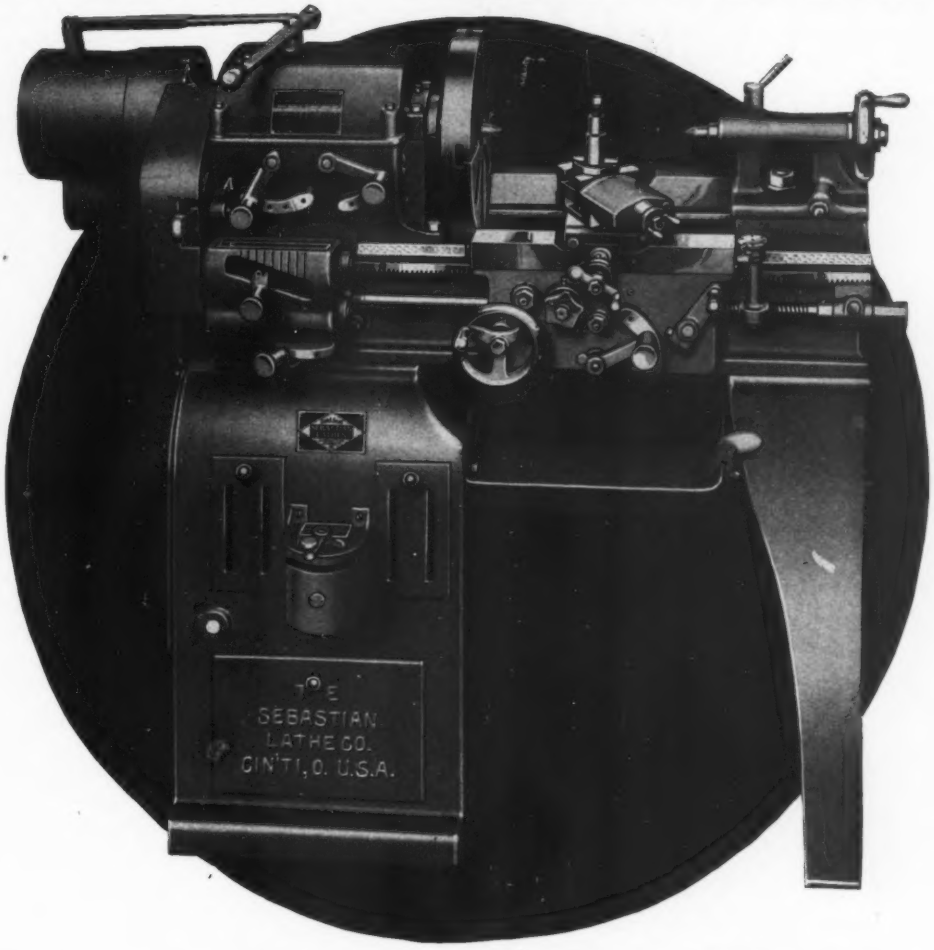

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ASSOCIATION NEWS

(Continued from Page 85)

the State University and the A. and M. College. The program was unique in that it included practical work, theory, and technical instruction in plumbing, as well as a number of teacher-training topics.

Mr. E. L. Williams, of the A. and M. College, talked on "Organization and Administration of Schools for Apprentice-Plumbers"; Mr. G. H. Fern of the same college discussed "The Use of a Standard Textbook in Plumbing Instruction"; Mr. M. K. Thornton of the college talked on "Science for Plumbing Instructors"; Mr. H. Dignowity of the University of Texas discussed "Methods of Organizing and Conducting Evening Classes"; Mr. S. E. Dibble of the Carnegie Institute of Technology, Pittsburgh, Pa., took up "The Analysis of the Plumbing Trade for Instructional Purposes"; Mr. Dignowity of the University gave a second talk on "Principles of Industrial Education"; Mr. E. K. Steel of the College talked on "Sanitation for Plumbers"; Mr. S. E. Dibble of the Carnegie Institute again talked on "Methods of Teaching Apprentice-Plumbers"; Mr. E. L. Williams gave another talk on "Observation and Practice Teaching," and Dr. F. E. Giesecke of the College discussed "Modern Plumbing Problems."

The conference was attended by a large and representative group, including journeymen, master, and chief plumbers, as well as those employed in the contracting, inspecting and engineering fields of this trade. Classes were held each day, from 8:00 a.m. to 5:00 p.m., and on Saturday from 8:00 to 12:00. At the banquet given for the entire group, President Walton impressed upon the visitors that the College offered a welcome at any time that the College could be of service to the industry. At this time a letter was read by President Walton in which the men thanked the college and the department of industrial education for the help received, and the hospitality shown the visitors. It was requested that the conference be made an annual affair.

NEW PUBLICATIONS

(Continued from Page 28a)

Airplane Model League of America, sells for five cents. The booklet lists the tools and materials necessary for the work and offers suggestions for the construction and finish of airplanes. The airplane league offers various helps in the building of model airplanes and maintains a free question and answer service on aeronautical problems.

A Bibliography of Electrical Literature. Paper, 62 pages. Bulletin No. 6, 1928, compiled by the electrical engineering committee of the commercial-technical group, Massachusetts Institute of Technology. Issued by the Special Libraries Association, 11 Nisbet St., Providence, R. I. The booklet has been compiled as a means of pooling the knowledge of useful aids for a common purpose. It provides in convenient form a list of the principal guides to study and research in the electrical field and is intended to offer a useful bit of public service. Included in the compilation are dictionaries, directories, cyclopedias and treatises, handbooks, indexes to periodicals, reference books, publications of societies, and statistics.

Effectiveness of Vocational Education in Agriculture. By Prof. Charles Everett Myers, department of rural life of the Pennsylvania State College. Paper, 60 pages. Bulletin No. 82, agricultural series No. 13, July, 1928, issued by the Federal Board for Vocational Education, Washington, D. C. A study of the value of vocational instruction in agriculture in the secondary schools as indicated by the occupational distribution of former students. The report is based upon data collected from 37 states and involves a study of over 800 high-school teachers of agriculture.

Deforested America. By Major George P. Ahern, Washington, D. C. Paper, 77 pages. A study of the forest situation in the United States and the measures taken for forest-fire prevention.

Annual Report of the Bureau of Technical Studies of the Chicago High Schools for the year ending June, 1928. The report shows that 18,013 of the 37,076 boys en-

(Continued on Page 33a)

(Continued from Page 30a)

rolled in the 25 high schools are taking courses in shop and drawing work. This means that one out of every two boys is receiving direct experience in practical construction work. The four-year technical course for boys is offered in eight of the general high schools, as well as at the Lane, Crane, and Tilden Technical High Schools. The four-year course is taken by all boys who enter the technical high schools, and where possible, it is recommended for boys in the general high schools who desire to take shopwork as a major sequence. Nine different courses of shopwork are offered in the technical courses, comprising woodworking, patternmaking, forging, foundry practice, machine-shop practice, electrical construction, auto mechanics, and printing. The Chicago high schools also offer two-year vocational courses for boys who do not expect to graduate, which comprise work in machine-shop practice, printing, mechanical drawing, electrical construction, and automotive repairwork.

AMONG the INDUSTRIAL ARTS TEACHERS

Mr. W. P. Beard, formerly of Brookings, S. Dak., has been appointed vocational inspector in Smith-Hughes agriculture for the South Dakota high schools. Mr. Beard will make his headquarters at Pierre.

Miss Elizabeth Journey, instructor in vocational home economics in the senior high school at Jefferson City, Mo., has resigned.

Miss Frieda Kean has been appointed assistant director of vocational activities for the New York City schools. Miss Kean has been teacher of art weaving in the James Madison High School.

The position of assistant director is a new one recently created, and carries an initial salary of $5,000 per year.

NEWS AND NOTES

OHIO MECHANICS INSTITUTE CELEBRATES THE CENTENNIAL OF ITS FOUNDING

The Ohio Mechanics Institute of Cincinnati, Ohio, celebrated the hundredth anniversary of its founding with an open house on November 22, 23, and 24. The Institute is the first technical school in the middle west to celebrate its hundredth anniversary, and was the first chartered school to be established in the northwest territory.

The open house in connection with the celebration was a three-day event, to which the public was invited. All lecture rooms, studios, laboratories, and shops were in operation both day and evening, with all students in their regular places. Among the laboratory features were the mechanical and electrical engineering laboratories. During this time, the industrial museum, as well as the Timothy Day Technical Library, was open for those desiring to inspect the rare collections and valuable technical volumes.

The institute alumni association took an important part in the celebration, to which the day and evening students and their friends, as well as the faculty were invited. On Friday evening, preceding the formal exercises in the Emery auditorium, the alumni sponsored a dinner, at which Prof. J. L. Shearer of St. Petersburg, Florida, was the guest of honor and the speaker. At least five hundred former students and graduates attended the dinner, representing classes, clubs, and fraternities.

Following the dinner, the official centennial celebration was held in the Emery auditorium. Mr. Charles J. Livingood, president of the board of directors, presided, and the speakers were Hon. Murray Seasongood, mayor of Cincinnati, and Dr. Dexter S. Kimball, dean of the college of engineering of Cornell University.

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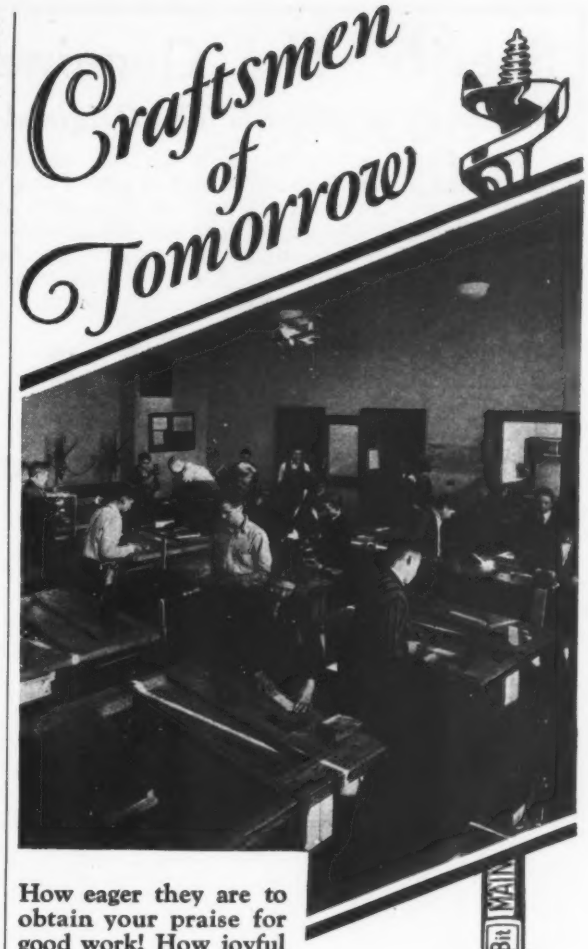

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The IRWIN Bit
REG. U.S. PAT. OFF.

IRWIN Auger Bits

Specify The Genuine

No Substitute Equals The Original.

The "Jorgensen" is the original steel spindle handscrew. It was first introduced in school shops about twenty-five years ago and today because of its serviceability and economy is still the acknowledged leader. The Genuine "Jorgensen" has the name stamped on the face. Look for this mark. Write for details on this and our other clamps.

TRADE MARK "Jorgensen" REG U S PAT OFF

Cold Drawn Steel Nuts
Cold Drawn Steel Spindles
Hard Maple Jaws.

12 sizes Adjustable Non-adjustable

"PONY"

REG. TRADE MARK U. S. PAT. OFF.

Steel Bar Clamp Fixtures

Make the most rapid acting Steel Bar Clamps on any length of Ordinary ¾" Iron Pipe.

"MARK" Clamps are made of best malleable iron — with cold drawn steel screws— Very durable and service is warranted by us.

Adjustable Clamp Co.

424 N. Ashland Ave.,

Chicago, Illinois

School Shop Equipment News

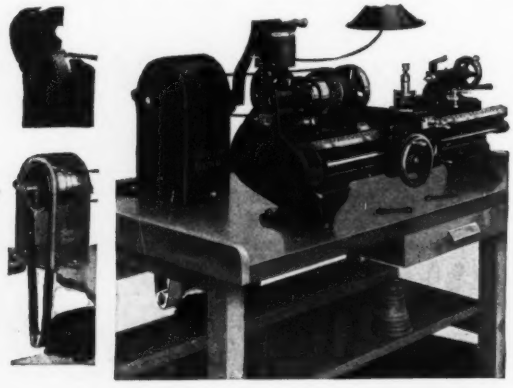
For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW MODEL No. 422 SOUTH BEND JUNIOR LATHE

The South Bend Lathe Works of South Bend, Ind., has announced the marketing of its Model No. 422, 9-in. junior horizontal motor-driven lathe, which is intended to be of use in the general school shop and trade and vocational schools.

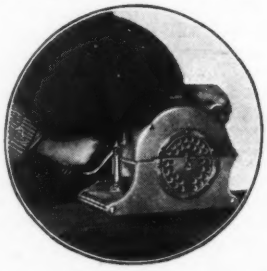
The new lathe is of the back-geared screw-cutting bench type, equipped with a horizontal motor drive which operates from an electric socket at an average cost of about two cents per hour. A ¼-H.P. reversing motor is attached to a shelf beneath the bench. A 2-in. leather belt from the motor, drives a jack shaft on which the drive pulley and countershaft cone are attached. This part of the mechanism is located in a cast iron cabinet. A drum-type reversing switch controls the operation of the lathe spindle. This switch has three different positions.

The new Model No. 422 lathe is practical, noiseless, powerful, and safe in operation and will be found very useful in the general school shop as well as the vocational department in the small school.



NEW REID-WAY BENCH SANDER

The Reid-Way Company of Cedar Rapids, Iowa, has announced the marketing of its new popular, light-weight electric bench sander. The machine is extremely simple in operation and is readily adapted for school use.



The machine is equipped with ball-bearing guide rollers, which makes it possible to regulate the depth of the cut and to insure a uniform finish by the operator; a handle in the front part of the frame is a convenience in using the sander; a suction fan increases the volume of air through the machine and an arrangement of baffle plates around the drum directs the air currents so that all the dust is blown into the dust bag. The machine offers a large measure of efficiency in

(Continued on Page 36a)

Can Your Students identify Walnut when they see it?

For the rest of their days, your students will be grateful to you for the knowledge of woods that you can give them.

It won't be so very long before these boys of yours will be buying furniture in their own behalf—many of them, perhaps, could help their parents right now.

And with the market filled with so many imitation woods, the best protection a furniture buyer can have is the ability to distinguish between the real and the imitation.

We have prepared a booklet which shows how anyone can quickly learn to identify genuine American Walnut. It would provide you with material for a half hour's instructive talk to your students—a talk that will give them real dollars-and-cents information. Just use the coupon to get your copy.

American Walnut Manufacturers Association
Room 3411, 616 South Michigan Avenue
Chicago, Illinois

Please send me your brochures on American Walnut.

Name_____

Address_____

AMERICAN WALNUT

New! **Two Speeds *in small* hand drill**

Finger-touch gives fast or slow speed; or locks tool for changing drills.

Just 11 inches

"Yankee" Tools teach efficiency: Finish the hole on low gear. Avoid jamming in drilling through . . . make hole true, smooth, free of burrs . . . save drills. Save time!

"Yankee" Two-speed Hand Drill No. 1435

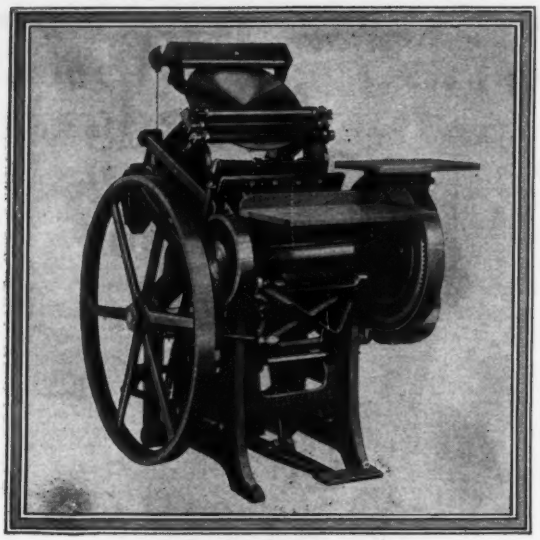
Length only 11 inches. Weighs but 19 ounces. Three-jaw chuck; ¼ inch. Only small drill that gives high speed for fast work and slow speed for easy drilling through. Price, $4.50.

"Yankee" Ratchet Hand Drill No. 1530

For work in tight places. Five adjustments, including "Yankee" Double Ratchet for continuous drilling where crank can be moved only to and fro. Length, 10½ inches. Weight, 1¼ lbs. Three-jaw; ¼ inch. Price, $5.25.

North Bros. Mfg. Co., Philadelphia, U. S. A.

"YANKEE" *on the tool you buy means the utmost in quality, efficiency and durability*



The Chandler & Price 10" x 15" Press

Weigh this *thoughtfully*

PRINTING takes its place as a most vital activity in the modern curriculum.

Printing trains the boy's mind and fingers. It enhances his appreciation of all that is fine and artistic. It helps open his mind to the labored wealth of art that has come down to us through the ages.

Printing is equally practical. Notices, invitations, programs, diplomas, announcements—you know how many forms, as well as school papers, can be turned out in your own buildings. And such an atmosphere all the while accustoms the man of later years to use printed matter conveniently, economically, successfully.

Have you *enough* Gordons in your Printing Department? Are you perhaps ready to start such a department? In either event, Chandler & Price will be glad to counsel with you.

Chandler & Price
PAPER CUTTERS & PRESSES

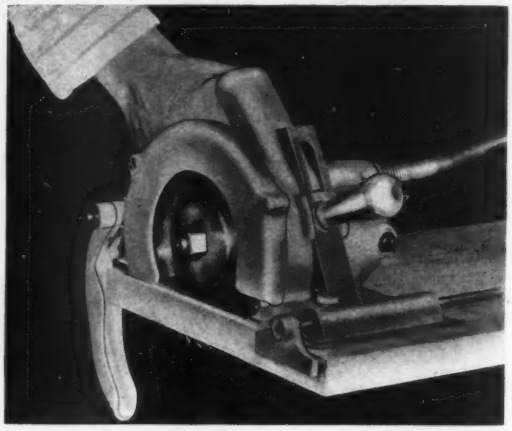
THE CHANDLER & PRICE COMPANY
Cleveland, Ohio, U. S. A.

(Continued from Page 34a)

surfacing floors, since it is possible to turn out one third more work than was possible with the previous model.

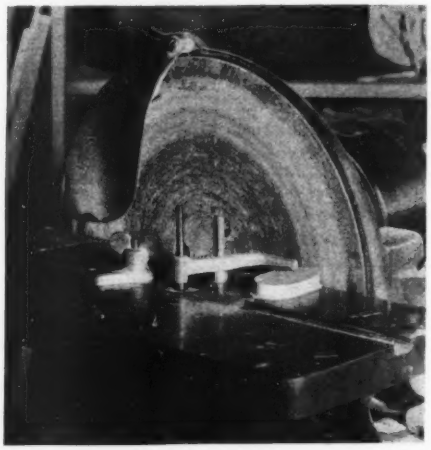
NEW PORTER-CABLE CORE-PRINT GAUGE AND PORTABLE SAW

The Porter-Cable Machine Co., of Syracuse, N. Y., has announced a new core-print or circle-generating gauge, which is capable of more rapid work in making core prints, bosses, and taper work. The device is superior to the former gauge, since the pattern is at all times visible, making it easy to follow the line.



The gauge consists of a base which slides in the slot on the table, a stop arm and thumb screw which locks the stop arm in place, and a radius arm having a piercing point at the extreme end. The gauge is practical for work from ⅛ in. to 5 in. in diameter, and 2 in. in height.

This company has also marketed a portable saw for use in rapidly removing the projecting ends of siding and flooring. It is a time-saving tool in the carpenter and pattern shops, as well as for maintenance work.



The saw is mounted on a special armature which runs in two precision ball bearings. This allows the full power of the motor to be applied direct to the saw blades, eliminating all trouble and friction caused by gears and couplings. The machine weighs only 10¾ lb., and is easily operated with one hand. The blade is 6 in. in size and is capable of cutting up to 1⅜ in.

THE HOLIDAY ISSUE OF THE SAW KERF

The current issue of the Saw Kerf, published by E. C. Atkins and Co., Indianapolis, Ind., contains a valuable paper for teachers on the Manufacture of Band Saws. The paper contains ideal material for a class lecture on the manufacture and use of saws. Copies of the magazine are available for teachers.

(Continued on Page 38a)

CONFIDENCE

A recent survey shows that during the school year of 1927-1928 a larger percentage of the printing materials sold to schools in the United States was furnished by the American Type Founders Company than by any other firm.

WHY?

The answer is: Because of selling only the highest quality of merchandise, rendering superior service and furnishing professional cooperation. These factors, by inspiring confidence in the minds of the school board, superintendent and supervisor, have enabled the American Type Founders Company to rise above the mere competitive method of selling to schools.

Printing Materials

The materials offered for sale by the American Type Founders Company for school purposes are identically the same in quality as are generally installed in modern commercial printshops.

The American School Type Cabinet No. 9178, the American School Imposing Table (two sizes) and the American School Pressroom Cabinet have been especially designed to facilitate instruction and to accommodate the comparatively small stature of school pupils.

Century Schoolbook type was designed according to specifications laid down by leading scientific authorities. It is the most legible type face ever made and considerable quantities have been sold to schools. Its use relieves the school authorities of a great responsibility in the care of children's eyesight. Hundreds of other type faces designed and produced by the American Type Founders Company offer a wide range of selection.

The American Type Founders Company has Selling Houses in most large cities. This affords the school executive close contact with the Company and prompt delivery of materials.

Service

The Education Department of the American Type Founders Company is equipped to help any school superintendent who expects to install printing in one school or several schools. Whatever the type of school or number of pupils, the efficient service of this Department is available.

In connection with the practical installation of printing for instructional purposes, the Education Department will write the specifications, make a blueprint layout showing the location of each piece of equipment in the proposed printshop, suggest teachers, in fact, arrange all details. This service is rendered without charge or obligation.

The staff of the Education Department is composed of persons who have had actual experience as teachers and executives in the educational field. Recommendations are therefore made from a professional standpoint.

This Education Department has assisted in the installation of probably ninety-five per cent of the three thousand school printshops in the United States.

Backed by many years of unquestioned business integrity, the American Type Founders Company inspires confidence in its products, selling methods and prices. When considering the installation of a new school printshop or the purchase of additional materials for existing school printshops, write to the

EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, *Jersey City, N. J.*

A Low-Priced Winner!

One of our best sellers is this No. 220 Mechanical Drawing Table — very roomy and comfortable, with an adjustable top, accommodating six students adequately yet in great compactness.

Just the Table for High Schools

It is a popular table for high school and junior high school use. Six compartments for six pupils—each one containing drawing board, T square, triangles, paper, and instruments—one key only for each pupil.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables.

Write for our complete Book of Illustrations.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL of INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Adrian Factory
C. G. Campbell, Pres. and Gen. Mgr.

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges

Adrian, Mich.

Kewaunee

(Continued from Page 36a)

NEW HANDBOOK FOR DRILLERS

The Cleveland Twist Drill Company, of Cleveland, Ohio, has just issued the twelfth edition of its "Handbook for Drillers."

The booklet serves as an introduction to the theory underlying the use of the twist drill. It describes how the twist drill is made and used, and how it is to be ground.

The booklet also contains tables of cutting speeds and feeds, as well as a table of recommendation as to what cutting compound to use and how to overcome some of the troubles encountered in drill-press operations.

THE STORY OF AMERICAN WALNUT

The American Walnut Manufacturers' Association has just issued a 45-page booklet entitled "The Story of American Walnut." The booklet weaves in some of the romance connected with this fine cabinet wood and describes and illustrates some of the adaptations of walnut to different types of furniture and interior finish.

The booklet offers a chronological table of period furniture and a classification of walnut furniture.

Yates-American Instructor. A magazine published for manual-training and vocational instructors, by the Yates-American Machinery Co., Rochester, N. Y. The present issue describes and illustrates various machines for the school shop. It also presents brief articles on furniture making, woodworking, and other lines of schoolwork. One page is devoted to questions regarding the operation of machinery, furniture design, and the supervision of classroom work. The booklet contains 48 pages. It is well edited and printed, and contains a great deal of practical information. The Yates-American Machinery Co. is to be congratulated upon this fine service which it is offering to the instructors of woodworking.

NEWS NOTES

(Continued from Page 33a)

The celebration was opened with a scene depicting the historical events in connection with the founding of the institute. The data was secured from histories of early Cincinnati and old records of the school, and much of the dialogue in the scene was authentic, having been recorded at a meeting in October, 1828, at the home of one of the founders. Students in costume took the parts of leading citizens of the time.

Announce Prize Winners in the Simonds Contest. The Simonds Saw and Steel Company of Fitchburg, Mass., has announced the prize winners in the Simonds contest which closed January 1, 1929.

The first prize of $1,000 has been awarded to Prof. Walradt, of the Ohio University, Columbus, and the second prize of $500 has been given to Dr. Shultz, financial economist of the National Industrial Conference Board of New York City. The prizes were won by experts from among a large number of essays, dealing with the subject, "Who Ultimately Pays the Taxes?"

UNITED TYPOTHETAE ASSOCIATION HOLDS FATHER AND SON WEEK

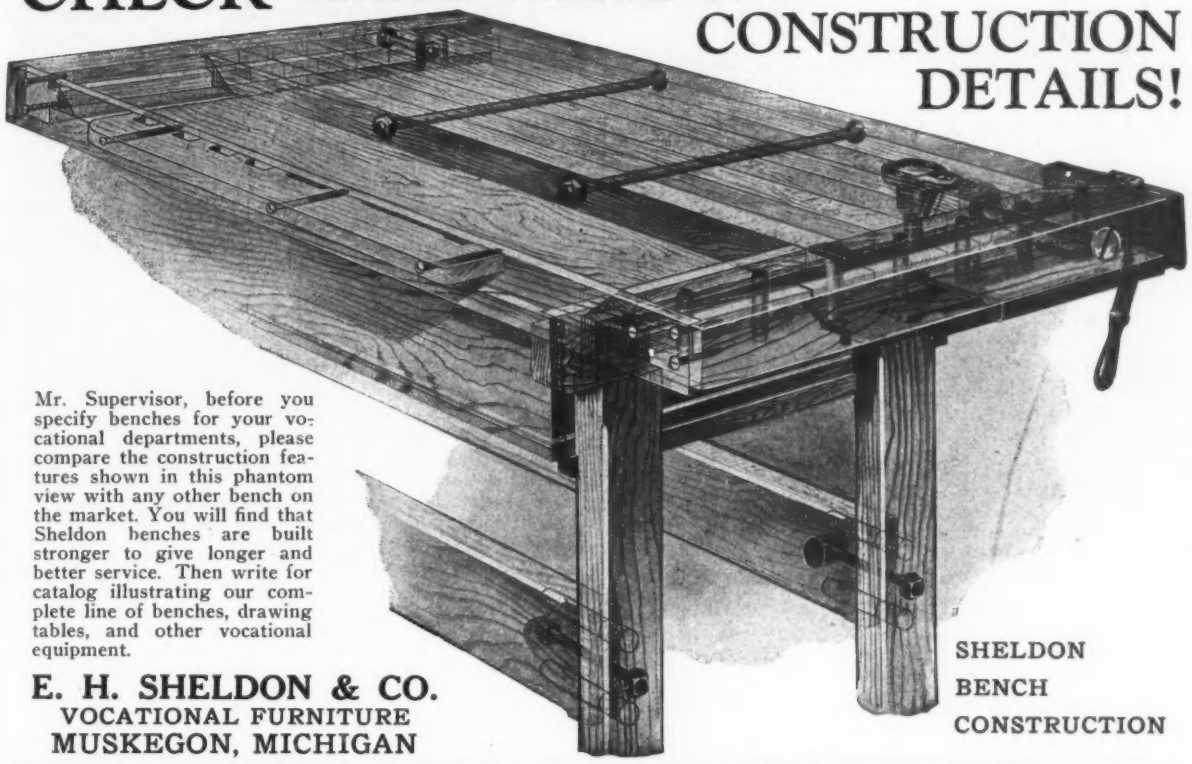
The United Typothetae Association of Chicago has announced that the Father and Son Week will be observed during the week of February 18. During the week, there will be father and son luncheons and dinner meetings for fathers and sons in the printing business, employer and employee meetings for employers and selected groups of employees, open-house meetings for teachers of printing and students who wish to visit printing plants, educational rallies with programs stressing printing topics, and talks by master printers and teachers of printing.

Last year the observance was successfully carried out in a number of cities and the movement was given the wholehearted support of the printing trade journals. One magazine devoted an entire issue to a father and son survey. The study, which covered twelve cities, showed that 355 sons were associated with 235 fathers, or were otherwise engaged in the printing industry.

Shop Training Advocated. Cooperative part-time education in which industry and the schools work together for a definite training objective has been advocated by the Federal Board for Vocational Education as a method of train-

(Continued on Page 41a)

CHECK THESE SHELDON CONSTRUCTION DETAILS!



Mr. Supervisor, before you specify benches for your vocational departments, please compare the construction features shown in this phantom view with any other bench on the market. You will find that Sheldon benches are built stronger to give longer and better service. Then write for catalog illustrating our complete line of benches, drawing tables, and other vocational equipment.

E. H. SHELDON & CO.
VOCATIONAL FURNITURE
MUSKEGON, MICHIGAN

SHELDON BENCH CONSTRUCTION

(Continued from Page 38a)

ing apprentices in the skilled trades. The board points out that through this method, a boy may obtain his training for the industry while gaining more technical and related information than he would have received under the apprenticeship plan.

Manual Training Added at Palatine. Manual training has been added to the course of study at Palatine, Ill.

New York City Board of Education Makes Appropriation for Vocational Schools. The New York City board of education in its school-building program for 1929 has included an appropriation of $10,250,000 for continuation and vocational schools. A new building is planned for the Brooklyn Technical High School, to cost $5,900,000. A boys' vocational school and a continuation school, to cost $1,125,000 each, are asked for the Borough of Brooklyn.

Manual- and Domestic-Arts Rooms Added at Memphis, Tenn. Adequate manual- and domestic-arts rooms have been planned for the Snowden School at Memphis, Tenn.

Trade Training to be Extended in New York State. Prevocational education, as part of the course of study for the seventh, eighth, and ninth years, with a possible extension into the sixth year of the elementary school, has been predicted by Mr. Oakley Furney, of the state department of education. Mr. Furney in speaking before the New York Vocation Teachers' Council, based his convictions on the general trend in industry to demand highly trained and intelligent employees, and a realization by the teachers of the futility of a curriculum devoted entirely to academic studies. Mr. Furney predicted a rapid extension of the trade and technical schools in the state and an increase in the number of continuation schools in proportion to the general promotion of vocational education.

Urges Trade Schools for Brooklyn Borough, New York. Dr. J. Herbert Low, principal of Erasmus Hall High School, Brooklyn, N. Y., speaking recently before the Flatbush Taxpayers' Association, urged a campaign in favor of vocational high schools for the Borough of Brooklyn. Dr. Low declared that a survey showed that 6,000 pupils, over 28 per cent, are absolutely unfitted for academic work. He stressed the fact that the failure of the city to provide a vocational school system is alarming in some respects, and pointed out that it is a mistake to think that education along certain lines is fitted for everyone.

New Mastbaum Trade School in Philadelphia. The school board of Philadelphia, Pa., has recently begun the equipment of the new Mastbaum Trade and Continuation School, which is to be devoted to the interests of boys and girls who are interested in a practical education.

The new trade school will offer a day school for boys and girls and evening school. There will be continuation classes for boys and girls between 14 and 16 years who are at work, full-time and part-time trade classes and part-time trade preparatory classes to fit the children for better industrial jobs. The school will combine manual-training classes, night classes, commercial classes in high schools, and continuation classes, and will at the same time, establish a new departure in practical education by establishing a center for the applied sciences.

Metal Work Offered at Springfield, Mo. The Frisco Railway and the high school of Springfield, Mo., have cooperated in establishing a course in metal craft and shopwork.

Plumbing Class at Erie, Pa. A cooperative plumbing class has been established in the East High School at Erie, Pa., for boys in the pre-employment class who will graduate in June as well as for apprentices.

Vocational Classes at Neodesha, Kans. Millinery, meal planning, and sewing classes have been established recently at Neodesha, Kans., under the direction of Mr. Jack Heywood.

New Workshop for the High School at Carrollton, Mo. The school board has begun work on a new workshop for the vocational agriculture department of the high school at Carrollton, Mo.

(Continued on Page 42a)

CARPENTRY JOB SHEETS

ADVANCED (1928) SERIES

Featuring Stair Building and Roof Framing. *Prepared especially for* Day and Evening Vocational Classes, Carpentry Apprentice Classes, Short Unit Courses for Journeymen

EVERY sheet contains authoritative teaching material produced by a large group of specialists whose efforts on this work have extended over a period of several years.

"These sheets, which represent the most modern type of teaching devices, are not the result of any one person's efforts. They represent the efforts of a group of carpenters who have had many years of success in their trade and in the teaching of that trade, a group of educators who have been in touch with modern teaching developments, and a group of experts from the staff of the International Textbook Company, Scranton, Pennsylvania, who have had years of experience in the preparation, editing and illustrating of text material in technical fields."

VOCATIONAL DIVISION, NEW JERSEY DEPT. OF PUBLIC INSTRUCTION

Sheets are 6 x 9, four pages per "sheet"

Elementary Carpentry Series (23 Sheets)	**$1.15**
Intermediate Carpentry Series (23 Sheets)	**1.15**
Advanced Carpentry Series (18 Sheets)	**.90**

These sheets cover the four-year carpentry apprentice course and the two-year day school trade course.

Reference Pamphlets are 6 x 9

Carpentry (314 parts), 427 pages, 328 illustrations	**$3.50**
***Builders' Hardware, 165 pages, 167 illustrations**	**1.25**
***Concrete Construction, 96 pages, 85 illustrations**	**.70**
***Foundations, 58 pages, 48 illustrations**	**.45**
Millwork (three parts), 210 pages, 227 illustrations (ready Feb. 1st)	**1.70**
***Operations Preliminary to Building, 40 pages, 22 illustrations**	**.30**
***Roofing (two parts), 130 pages. 140 illustrations**	**.95**
***Stair Building, 57 pages, 57 illustrations**	**.45**
***The Steel Square (two parts), 135 pages, 105 illustrations**	**1.00**

*These are supplementary pamphlets and only one or two sets are required for a class. Prices are net, postpaid.

We have a helpful list of "Good Suggestions" for instructors desiring to use these sheets. A copy will be sent on request.

Other Sets of Job Sheets

Mechanical Drawing, 75 Blueprint Sheets, 8½ x 11	**$1.25**
Printing, 35 Lesson Sheets, 6 x 9	**1.50**

SEND FOR YOUR SET ON APPROVAL

INTERNATIONAL TEXTBOOK CO.

ON APPROVAL COUPON

INTERNATIONAL TEXTBOOK CO.
Box 8903-B, Scranton, Pennsylvania

Send me on approval your texts on the following subjects:

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.....

I agree to return them if not adopted in my classes or to remit for same.

Name.....

Position.....

School.....

Address.....

(Continued from Page 41a)

Farm Class Erects Its Own Workshop at Ponca, Nebr. The farm class in the high school at Ponca, Nebr., has recently erected a farm workshop for the agricultural classes of the Ponca High School. The work was done by two classes of boys under the direction of Mr. H. F. Vance, teacher of vocational agriculture.

The building will be used entirely for farmshop practice and the boys will build articles like wagon boxes, hay racks, hog houses, self-feeders, and brooder houses. Instruction will be given in forging, soldering, and farm machinery repair.

New Vocational School at Green Bay, Wis. The contract was recently let for the construction of the new vocational school, to be erected at a cost of $253,815.

Vocational School in Baltimore Teaches Six Trades. The vocational training school in the old college building at Baltimore, Md., is offering instruction in six basic trades. The list includes all crafts in the automobile repair line, the electrical trades, machine-shop practice, pattern-making, plumbing, and cabinetmaking trades. The work of the vocational school is supervised by a so-called steering committee, which works in conjunction with the advisory councils composed of employers and employees. These groups meet with Mr. Charles W. Sylvester, director of vocational training, and with the faculty of the trade classes directly interested.

Suggestions for the layout of the trade school, the purchase of equipment and materials, and the program of teaching are discussed at these conferences.

Students graduated from these vocational schools are not classed as journeymen in their trades, but as apprentices, and they are required to serve the usual apprenticeship in the industrial or building trade which they enter. They will be apprentices of a skilled type, trained in the basic knowledge and practical details of their particular trade. The elimination of the unfit and incompetent is done at the school and not in the ranks of the working trade, which will save the industries considerable expense in labor turnover and will make for a better class of mechanics.

Portland Apprentices Study Heating Problem. The apprentices in the home-building class at Portland, Oreg., in connection with the construction of a model home, made a special study of heat as a part of the building construction. A warm-air system of heating was used in the model apprentice-built home, with a four-burner gas-fired furnace capable of delivering 90,000 b.t.u. heat units an hour. The location of heat registers and the size of heat ducts were given careful consideration. Mr. E. E. Erickson, of the local sheet-metal contractors' association, acted as trade advisor for the heating work, while Mr. C. E. Holzer, apprentice instructor in sheet-metal work, directed the actual installation of the heating plant.

Erect Workshop at El Reno, Okla. The board of education has awarded the contract for the erection of a workshop for the vocational-agriculture class of the high school, El Reno, Okla.

New York City School Board Plans Extensive Vocational Program. The board of education of New York City has planned an extensive program of vocational and technical education, to include a $5,000,000 city-wide technical high school, additional trade school for boys and girls in each borough, and the establishment of junior vocational schools. The new program is intended to meet the demands for industrial education, and to provide for the needs of boys and girls not adequately met by the junior- and senior-high-school courses.

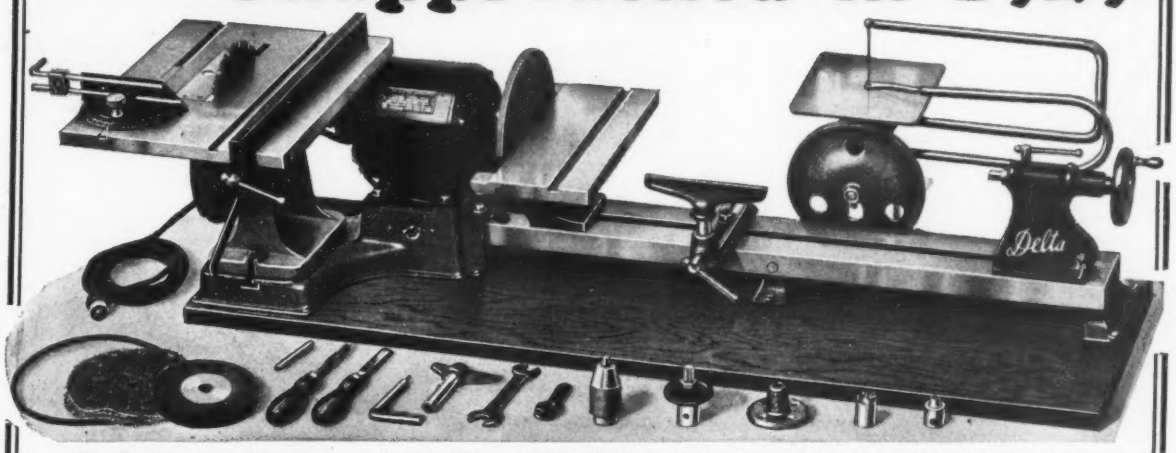
The main feature of the program is the new building for the Brooklyn Technical High School, which will be a city-wide building, with expensive shops, and costing between $5,000,000 and $6,000,000.

Plans are also in preparation for a new Brooklyn Trade School for Girls, to accommodate 1,500 girls, and a new Bronx Vocational School for Boys. Included in the program is a combined vocational and continuation school building for Staten Island, a site for which has been selected.

Another feature of the program is the organization of junior vocational schools for pupils in the sixth, seventh, and eighth-year classes who do not profit from the usual academic

(Continued on Page 45a)

Unequalled in 1928— Unapproached in 1929



Check the specifications of the New 1929 Model DELTA Electric Handi-Shop. Investigate the 20 New Features that put DELTA so far in the lead. Here are just a few—Improved Miter Gauge, New Circular Saw Adjusting Lever, New Rip Gauge, Larger Triple Foundation Lathe Bed, ½ inch Capacity Drill Chuck and Husky ⅓ H.P. Motor.

Delta For Quality — Delta For Capacity

DELTA SPECIALTY CO., Dept. M-29
1661-67 Holton St., Milwaukee, Wis.

....Please send, without obligation, FREE illustrated literature describing new 1929 Model Delta Handi-Shop.

....Please send me copy of "How to Make Things With a Workshop."

Name .....

Address .....

(Continued from Page 42a)

studies. At least two such schools will be established in 1930, or in the fall of 1929.

Manual Training for Retarded and Subnormal Pupils. Mrs. A. M. Plumptre, a trustee of the board of education of Toronto, Canada, recently presented a report to the board dealing with the adjustment of retarded and subnormal pupils in the schools. Mrs. Plumptre tells about a survey in the Regal Road School, conducted under the auspices of the Mental Hygiene Council of Canada, which is intended to throw some light on the solution of the retardation problem in the schools. Attention has been directed to the experiments carried on in schools by the principals, in cooperation with the inspectors, and testing arrangements of the staff and school program to meet the needs of both average and special pupils.

It is the purpose of the board to build a new central school which will give opportunity to meet the needs of all types of students, and will prove a model for schools in the more congested sections.

Attention was called to a recent statement of the Minister of Education, in which he is quoted as describing a public-school education to be completed at the age of 15, with a strictly post-primary course to be completed in seven years. This would imply a revision of the school curriculum with a trend toward vocational education for pupils not readily adaptable to secondary education, and stressing particularly those subjects involved in the trade and industry of the community. In this way, subnormal and retarded pupils could receive, without prohibitive cost, a complete education in the school to which they are accustomed.

In her report, Mrs. Plumptre stressed the fact that the main purpose is to assist the dull pupil with academic work through the medium of manual training. The need is to recognize demand for an adjusted curriculum for a group of subnormal pupils, and the need of a special school or class of a primary nature into which the subnormal may eventually pass.

Hold Open House at Brooklyn Polytechnic Institute. The Polytechnic Institute of Brooklyn, N. Y., held open house on Friday, January 11, between 4:30 and 10:00 p.m. At that time, the laboratories and shops of the school were in operation and student guides conducted the visitors through the building.

The exhibit included demonstrations in chemical manufacture, radio communication, X-ray, automobile and airplane engines, industrial gas equipment, hydraulic machinery, and many other interesting experiments.

A motion picture portraying the four large fields of engineering, i. e., civil, electrical, mechanical, and chemical, was presented.

General Shop at Bristow, Okla. A general shop has been organized at Bristow, Okla., this year, under the direction of Mr. G. W. Haller. The plans for this year include courses in forging, foundry work, sheet-metal work, electricity, and automobile mechanics. All of these activities will be carried on in the shop at one time, each class being divided into four sections.

Announce New Educational Film. "The Story of a Gasoline Motor" is the title of a new educational motion-picture film just released by the U. S. Bureau of Mines, in cooperation with a large industrial concern. The picture shows graphically the engine parts and the forging process, and should prove of considerable interest to auto-mechanics and other shop students. Copies of the film may be obtained from the Pittsburgh Experiment Station of the U. S. Bureau of Mines, Pittsburgh, Pa.

Aeronautics at Visalia, Calif. The board of trustees of the Visalia Union High School at Visalia, Calif., has approved a course in aeronautics for the high school and junior college. A shop building has been erected, at a cost of approximately $10,000.

Findlay Vocational Shops Dedicated. The new vocational building at Findlay, Ohio, was dedicated on December 7.

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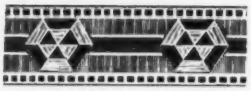

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